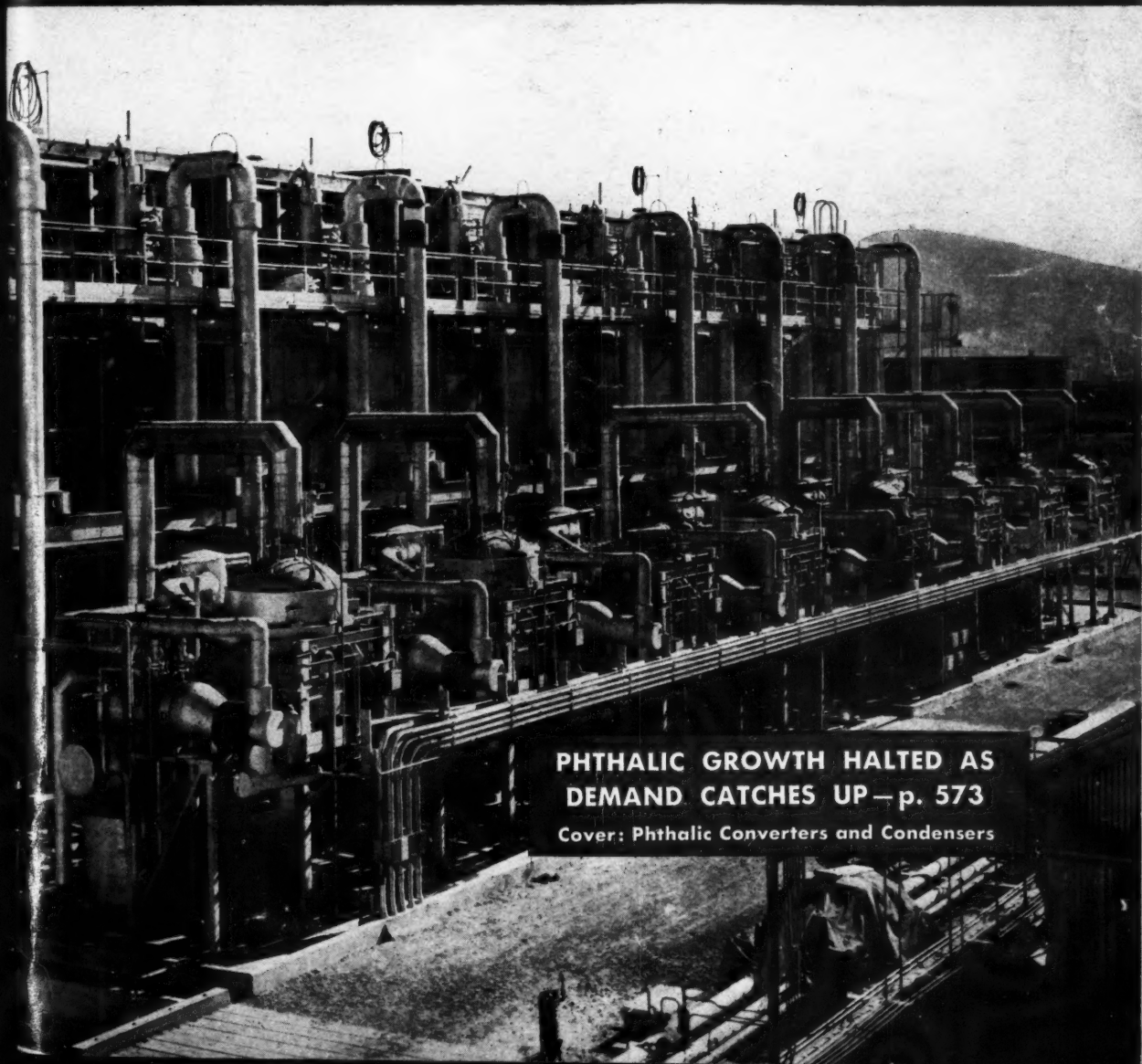


1949

Chemical Industries

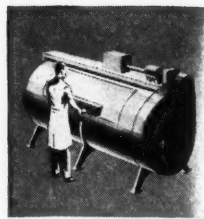
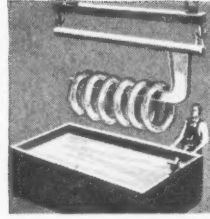
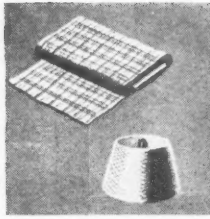
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**PHTHALIC GROWTH HALTED AS
DEMAND CATCHES UP — p. 573**

Cover: Phthalic Converters and Condensers



Only NYTRON

TRADE-MARK REG. U. S. PAT. OFF.

gives you this versatile combination of properties

**SOLVAY'S
NEW
SYNTHETIC
ORGANIC
DETERGENT**

<p>✓ NYTRON HAS EXCEPTIONAL DETERGENCY for use in institutional cleaning, manufacturing plants, industrial processes, dairy cleaning, and in the compounding of a wide variety of products; can be used alone, or combined with acids or alkalis.</p>	<p>✓ NYTRON COUNTERACTS HARD WATER DIFFICULTIES; more economical because increased quantities do not have to be added to compensate for water hardness; completely prevents the formation of scum, grease rings, streaks, spots.</p>	<p>✓ NYTRON HAS HIGH SOLUBILITY; water solutions containing as much as 36% NYTRON can be prepared at 77°F.; will not "salt out" in concentrated solutions of many metallic salts.</p>
<p>✓ NYTRON REDUCES WETTING TIME from a matter of hours required in plain water to a matter of seconds; produces splendid results under a wide variety of conditions.</p>	<p>✓ NYTRON REMAINS CHEMICALLY STABLE under extreme conditions of temperature, acidity or alkalinity; suffers no chemical breakdown or loss in detergency when used in solutions of either weak or caustic alkalis.</p>	<p>✓ NYTRON REDUCES SURFACE TENSION even under extremely varying conditions; addition of only 3½ ounces to 100 gallons of water will reduce surface tension by more than 50%; this action is actually enhanced under hard water conditions.</p>
<p>✓ NYTRON RINSES THOROUGHLY, QUICKLY in cool or even cold water; does not leave an insoluble deposit.</p>	<p>✓ NYTRON HAS EXCELLENT EMULSIFYING POWER to remove oil and grease from fabrics, surfaces, metal parts.</p>	<p>✓ NYTRON WILL FOAM in any normal concentration of acid or alkali, in distilled or sea water, in ice cold or boiling water.</p>

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I want to know more about NYTRON, the entirely new type (patented) synthetic organic detergent, and what it can do for my business. Please send me detailed non-technical information and specific technical data on NYTRON.

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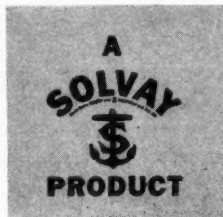
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Company

Type of Business

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This low-cost synthetic organic detergent is made by a new, exclusive, patented process. It is a basic product with a chemical structure unique in the synthetic organic detergent field.

Get detailed information and specific technical data on how NYTRON can help your business.

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CAUSTIC POTASH

Liquid 45-49%. Flake and Solid 85% and 88-92%. A particularly uniform product, made to traditional Westvaco standards, consistently low in iron, chlorides and carbonates.

CAUSTIC SODA

Liquid 50%—Standard and Rayon Grades.
Liquid 70-73%. Flake and Solid, 76% Na_2O .

**Uniform Quality
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Inquiries Invited**

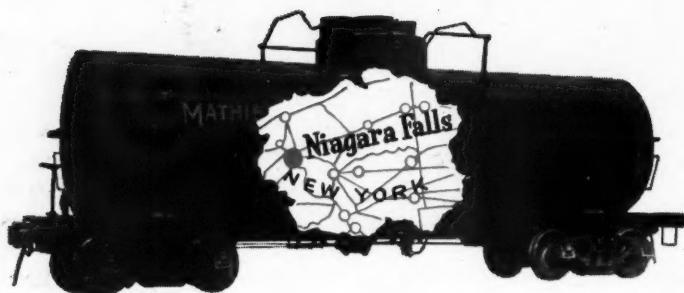
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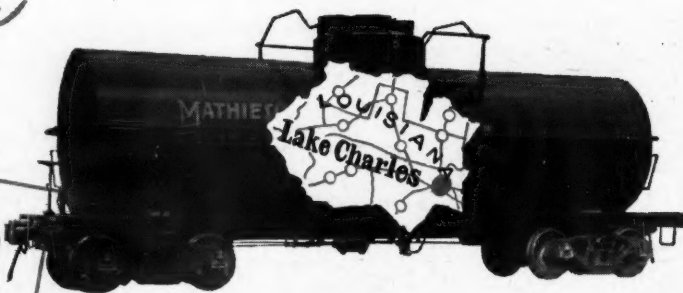


three-point Dependability

Out of Mathieson's three producing points—each geographically located in principal caustic-consuming areas—roll hundreds of modern tank cars speeding to meet industry's need for high-grade caustic. The strategic location of these three plants permits substantial savings in shipping costs...provides *dependable* sources of caustic to consumers having several plants in areas served by Mathieson—one source of supply with *three* producing points. Mathieson Chemical Corporation, 60 East 42nd Street, New York 17, N.Y.



Specify Mathieson



Chemical Industries

Vol. 64, No. 4

APRIL 1949

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

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Chemical Industries is indexed regularly by Engineering Index, Inc., and Industrial Arts Index.

Cover: Standard of California

EDITOR: R. L. Taylor; BUSINESS MANAGER: W. A. Jordan

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Published monthly at 1309 Noble St., Philadelphia 23, Pa., and entered as 2nd class matter July 15, 1944, at the Post Office at Philadelphia 4, Pa., under the Act of March 3, 1879. Subscription \$5 a year, \$8 for two years, \$10 for 3 years. Add \$2 per year for postage to Latin America. Other foreign rates, except Canada, \$15 one year, \$30 for 3 years. Single copies 60c, except special issues. Canadian subscriptions and remittances may be sent in Canadian funds to Chemical Industries, P. O. Box 100 Terminal A, Toronto, Canada. Copyrighted 1949 by MACLEAN-HUNTER Publishing Corporation, 522 Fifth Avenue, New York 18, N. Y. MURRAY Hill 2-7888. Horace T. Hunter, President; E. R. Gauley, Vice-President; J. L. Frazier, Secretary. OFFICE OF PUBLICATION: 1309 Noble Street, Philadelphia 23, Pa. EDITORIAL & EXECUTIVE OFFICES: 522 Fifth Ave., New York 18, MURRAY Hill 2-7888. DISTRICT OFFICES: Chicago; 309 West Jackson Boulevard, Chicago 6, Ill., HARRISON 7-7890. Los Angeles; 1709 W. 8th St., Los Angeles 14, Calif., FAIRfax 8576. San Francisco; 57 Post St., San Francisco 4, Calif., YUKon 6-1069. London: Sun Life of Canada Bldg., Trafalgar Square, London, S. W. 1, England.

A MACLEAN-HUNTER publication, Horace T. Hunter, President

April

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Plasticizer OF THE MONTH

BENZYL CAPRYL SEBACATE

Molecular Weight 404
Boiling Point 245-267°C @ 4mm.
Specific Gravity 0.9770 @ 20/20°C.
Saybolt Viscosity 40.2 Seconds @ 210°F.
Color Light Straw
Weight 8.3 lbs. per gallon.

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An extraordinarily permanent plasticizer of extremely low volatility and good resistance to extraction. Its good compatibility and excellent low temperature properties are of great assistance to the compounder of vinyl resins and synthetic rubbers in the formulation of consistently top-quality products.

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DIBENZYL SEBACATE
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DIHEXYL ADIPATE
DIHEXYL PHTHALATE
DIMETHYL SEBACATE
BUTYL BENZYL SEBACATE
CAPRYL BENZYL SEBACATE

HARDESTY CHEMICAL CO., INC.

41 East Forty-second St., New York 17, N. Y.

THE READER WRITES

The Young Science

To the Editor of Chemical Industries:

"Product Development to the Fore" was a good title for your editorial in the February issue. The increasing interest and organization by the chemical industry toward product development is certainly a recognition of what can be gained through the application of the young science of "commercial chemical development." Fewer and fewer companies are calling in salesmen and giving them a product to "develop." It's now a case of teamwork where chemical marketing surveys, and applied research, basic research, product development and technical service are all combined to result in the development of new chemical products.

There is one thing which to me is the heart of "commercial chemical development" and which was implied but not stated in your editorial. The best way to get a "foot in the door" for a new product in the competitive era we all see ahead is through development of the practical applications and formulations for these new products before they are released for sampling and evaluation outside.

In other words, the burden of proof is now, more than ever, on the developer of new chemical products rather than on the prospective user. While the prospective user is quite interested in improving his own products, we in commercial chemical development now must prove almost conclusively that it is our new product which is the "cure for what ails him." Not only that, but he must be shown pretty thoroughly how to go about applying this product to his problems.

The intelligent developments of applied research, the compilation of clear accurate data sheets and the systematic placement of samples, on an intensive basis, rather than the extensive basis which has been used widely in the past, makes the difference between whether a new product is looked at seriously by potential users or whether it just gets casual attention. It is the old sales story, "It's not how good it is—it's how well it solves the customer's problem and fills his needs."

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Silicone-Glass Laminates

To the Editor of Chemical Industries:

In the February issue I note an article on the use of silicones which covers the various industrial applications of silicone polymers. One major and growing field of silicone applications has been omitted from what is otherwise a comprehensive discussion. I refer to glass-silicone laminates.

Our company has been engaged in the development of a glass-silicone laminate for the past two years, as have other companies prominent in the high pressure laminating field. At the present time we have a glass-silicone combination which has electrical, physical and heat resistant properties superior to any other known laminate.

In your CI Report on urea and melamine products, also in the February issue, there is stated concerning melamine laminates, "they have excellent strength characteristics and outstanding electrical properties. The Fiberglas laminates provide a combination of electrical properties and heat resistance unequalled in other types of resins. Their extremely good arc resistance and their non-inflammability recommend their use for electric panel boards, and they were used very extensively for this purpose during the war."

Obviously, silicone laminates are not too well known to your researchers, for these laminates have equal strength characteristics, better electrical properties, higher heat resistance, better arc resistance and better chemical resistance than melamine-Fiberglas laminates. Their use for electrical panel boards is contemplated by the U. S. Navy, for they subsidized nearly all of the early development work on silicone laminates. It is expected that this combination will supplant melamine-glass laminates in panel board applications.

G. H. HOPKINS, Research Manager
Taylor Fibre Co.
Norristown, Pa.

Maybe It Was Africa

To the Editor of Chemical Industries:

You might tell "Doc" that we very much enjoyed reading his Lion Powder story on page 156 of the January issue, but anticipating his passion for accuracy, we would like to point out that lions are not numbered amongst the fauna of India, but of Africa only. The substitution of tigers in India or lions in Africa in no way detracts from the absurdity of the story, but you might point out to him that never the twain shall meet.

J. C. RICHARDS, Manager
Western Chemicals, Inc.
Portland 1, Oregon

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OF POTASH**



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Chromic Acid**

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FOR YOUR INFORMATION



LOW-COST PLASTICIZER now available in quantity

Santicizer* 160 is now available at reduced prices—for immediate shipment in any quantity. Since it is less expensive than any other plasticizer of comparable quality, Santicizer 160 will help you reduce compounding costs, yet maintain excellent performance characteristics.

Santicizer 160 combines many plasticizing advantages . . . It makes possible economical reductions in processing temperatures for vinyl films, sheetings, extrusions and floor tiles—lowers burning rates of these materials.

Complete information and samples of Santicizer 160 will be sent immediately upon request. Contact any District Sales Office, write or note your request on the coupon on opposite page. Ask also for your copy of "Monsanto Plasticizers," a new, comprehensive treatise on plasticizing action, applications and performance results of Monsanto plasticizers.



ADVANTAGES OF SANTICIZER 160

1. Low Cost (recent reduction makes it lowest-priced plasticizer of comparable quality).
2. Excellent Processing Action (enables lower calendering temperature or faster rates of operation).
3. High Tear Strength.
4. Low Burning Rate (less flammable than most phthalate-type plasticizers).
5. High Tensile Strength.
6. Readily Available in Quantity.

Dependable Source of Supply

Monsanto's basic position on raw materials assures a steady supply of highest-quality plasticizers. Consult Monsanto technicians . . . They are especially qualified to assist you in any problems in this field.

SYNERGISTIC ACTION GIVES HIGH DETERGENCY AT REDUCED COST

Santomerse* No. 1 and TSPP improve efficiency of cleaning compounds, textile processing

Cleaning power of Santomerse No. 1

Cleaning power of tetrasodium pyrophosphate

Mathematical average cleaning power of Santomerse No. 1 and TSPP

Actual cleaning power of Santomerse No. 1 and TSPP delivered through Synergistic Action

A substantial bonus in detergency is available at lower cost by employing the synergistic action of two Monsanto products — Santomerse No. 1 and tetrasodium pyrophosphate. What is synergistic action? Suppose, for example, you mix Santomerse No. 1, a product of high detergency, with TSPP, having lower cleaning power, you naturally expect effectiveness that strikes an average of the two. Actually, however, the result is detergency higher than the average . . . higher than the cleaning power of either product. This co-operation of the two Monsanto products, bringing a bonus in effectiveness, is synergistic action.

Since TSPP is priced even lower than economical Santomerse No. 1, the use of the mixture lowers costs while delivering higher detergency.

Look into the possibilities of synergistic action in reducing your costs while increasing the efficiency of industrial cleaning compounds and textile cleaning and scouring operations. For details, contact the nearest Monsanto District Sales Office, write, or note your request on the coupon.

GOOD AVAILABILITY

Prompt delivery of Santomerse No. 1 or TSPP can be made from the nearest of thirteen conveniently located producing and shipping points.

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95% (1
max.

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SPECIFIC
Appears
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THESE INTERMEDIATES OFFER HELP IN YOUR DEVELOPMENT PROBLEMS

If you are looking for ways to improve your products, or to develop new ones, try the four Monsanto intermediates described here . . . They may readily help you reduce production costs, increase profits, or even open wide new business frontiers.

If your research develops uses for any of these Monsanto products, you can be sure of ample supply at reasonable prices. Samples for test purposes will be furnished promptly without charge.

para-AMINOBIIPHENYL, TECHNICAL

SPECIFICATIONS

Appearance and Color: Yellowish-brown crystalline mass. **Crystallizing Points:** 50.5°C. min. (indicates purity of 94.5% para-Aminobiphenyl min.)

ADDITIONAL PROPERTIES

Distillation Range:

First drop, 325.0°C. min.; 1-96 ml., 8.0°C. max.; 100% (First drop to dry point), 10.0°C. max.; Dry point, 340.0°C.
Specific Gravity: (60.0°C./15.5°C.) approx. 1.06

POSSIBLE APPLICATIONS

Intermediate in dyestuff synthesis; organic and pharmaceutical synthesis; synthesis of insecticides.

para-NITROBIIPHENYL

SPECIFICATIONS

Appearance and Color: Brown, crystalline solid. **Crystallizing Points:** 110.0°C. min.

Composition From Vacuum Distillations:

para-isomer, 94.0% min.; ortho-isomer, 6.0% max.; High boiler, 1.0% max.

ADDITIONAL PROPERTIES

Specific Gravity: approx. 1.154

Boiling Points: approx. 340°C.

(At atmospheric pressure)

Flash Points: approx. 164°C. (Tag open cup).

Fire Points: approx. 189°C. (Tag open cup).

POSSIBLE APPLICATIONS

Intermediate in dyestuff synthesis; organic and pharmaceutical synthesis; synthesis of insecticides.

BENZYL CHLORIDE

SPECIFICATIONS: (For anhydrous liquid and material recovered from stabilized solution.)

Appearance and Color: Colorless to light-yellow liquid.

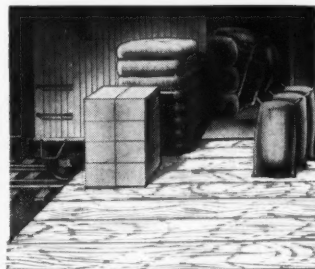
Specific Gravity: 1.104-1.108 at 15.5°/15.5°C.

Distillation Range: First drop, 177.5°C. min.; 95% (1-96 ml.), 3.0°C. max.; Dry point, 185.0°C. max.

ortho-NITROCHLOROBENZENE

SPECIFICATIONS

Appearance and Color: Greenish-yellow crystalline mass. **Crystallizing Points:** 31.7°C.



PENTA CHLOROPHENOL preservative

Santophen* 20 provides clean, long-lasting protection for all types of wood construction

Wood properly treated with Penta is CLEAN and STAYS CLEAN. It resists leaching even under conditions of high humidity or moisture; is paintable when formulated with suitable carrier oils. This non-bleeding quality of Penta is especially important where people or packaged goods come in contact with wood . . . It will not stain; has no objectionable odor.

Penta's high toxic value assures years of dependable protection against exposure, wood-rotting fungi, termites and other wood-boring insects. This toxicity never varies, since the chemical characteristics of Penta are always constant, always laboratory-controlled.

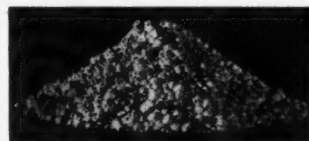
The Penta treatment, by either pressure or open-tank method, is simple. To learn more about its advantages, send for your copy of a new Monsanto folder, "Monsanto Pentachlorophenol for Preserving Wood in Industrial Construction."

Where Penta Makes Wood Last Longer

Platforms and Decking • Loading Docks • Catwalks and Railings • Ice Plants and Storage Houses • Grandstands and Stadium Buildings • Warehouses and Granaries • Tool and Machinery Sheds • Trestles and Bridges • Guardrails • Utility Poles • Signs and Billboards • Factory Flooring • Sills, Plates, Joists • Rafters and Roofing • Sash and Doors • Ladders and Stairs.

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SANTOBRITE DUSTLESS PELLETS SIMPLIFY HANDLING, STORAGE



Sodium Pentachlorophenate, Tech., has many uses as industrial preservative, fungicide, herbicide

Santobrite* is now available as pellets. Among the several advantages of this new form are: elimination of dusting, rapid solution in water, ease of handling, less storage space requirements per pound . . . The pellets are designed chiefly for the comfort of those who have found Santobrite dust bothersome. Santobrite will still be available in powder and briquette forms.

Santobrite is an industrial preservative, fungicide and herbicide with a wide range of applications, including the control of slime and algae in cooling water systems. If you are not already familiar with this and other important uses, write for full information . . . Samples for test purposes will be furnished without charge.

MONSANTO CHEMICAL COMPANY, Desk D, 1703 South Second Street, St. Louis 4, Missouri. District Sales Offices: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.



Serving Industry . . . Which Serves Mankind

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Please send me more information on:

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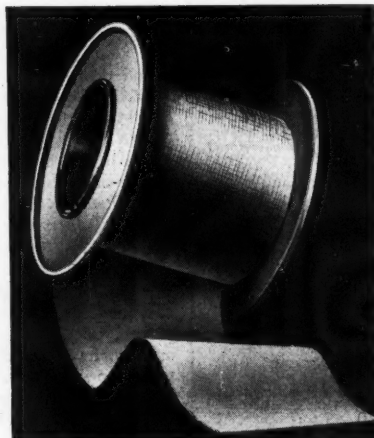
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USE ORONITE POLYBUTENES FOR TACKINESS..HIGH DIELECTRIC STRENGTH..MOISTURE RESISTANCE

Adhesives, electrical insulation, sealing compounds, insecticides, leather and many other products can be greatly improved with Oronite Polybutenes.

Because of its inherent tackiness, this extremely useful product offers adhesive formulators, close control of "quick grab," "legs," and removal characteristics. High dielectric strength, low power factor, stability, moisture resistance and flexibility are a few additional advantages of Oronite Polybutenes.

Here also, is an excellent bodying agent. Eight grades of viscosity are available to meet specialized conditions. They can be compounded with a wide range of resins, oils, waxes, elastomers and adhesives. Investigate this important product today. Call or write the Oronite office nearest you.



In formulating adhesives, Oronite Polybutenes offer a wide range of variation in control of initial tack, strength, softness, removal characteristics and hot melt viscosity. They are adaptable in all types of mechanical application of adhesive composition onto backings whether it be by hot melt, solvent or emulsion. This versatile chemical product offers new possibilities in formulations requiring tackiness, pliability, moisture resistance, bodying or high dielectric strength.

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 for your use?**



**Monobenzyl Ether
 of
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**Dibenzyl Ether
 of
 Hydroquinone**

THESE Ethers of Hydroquinone have advantageous possibilities in several important industrial fields.

Monobenzyl Ether of Hydroquinone may be useful to you as an anti-oxidant, a stabilizer, a polymerization inhibitor or for organic synthesis. Its applications are in these and other industries: dyestuffs, explosives, drug, medicinals, petroleum, plastics and photographic.

Dibenzyl Ether of Hydroquinone is a high boiling, inert solvent—suggested for use in the cosmetics, soap, plastics, pharmaceutical and related industries.

Both compounds are available in commercial quantities. Full information and prices furnished promptly upon request. Please write Dept. CC-4, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

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SHARPLES

BUTYLAMINES

MONOBUTYLAMINE
DIBUTYLAMINE
TRIBUTYLAMINE



Butylamines serve as raw materials in the manufacture of pharmaceuticals, dyestuffs, rubber chemicals, flotation reagents, emulsifying agents and corrosion inhibitors.

Monobutylamine, Dibutylamine and Tributylamine are available in tank car quantities.

SPECIFICATIONS

	MONOBUTYLAMINE	DIBUTYLAMINE	TRIBUTYLAMINE
Color	Water White	Water White	Pale Yellow
Specific Gravity @ 20°/20°C.	0.74-0.75	0.76	0.77-0.78
Acid insolubles max.	0.4%	0.5%	0.5%
Butylamine content min.	96.5%	98%	96.5%
Distillation:			
Initial B. P. Min.	73.0°C.	153°C.	—
95% below	81.0°C.	163°C.	—
Final B. P. Max.	85.0°C.	165°C.	—
95% between	—	—	199-216°C.

For additional information
write to Dept. A



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A clear, amber, 25% active liquid, slightly modified for unusual performance—ready to use—packed in non-returnable open-head drums.

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A uniform 40% active flake—light in color—mild in odor—excellent detergency, wetting and foaming qualities—low in dust content.

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Low in salt content—85-87% active flake—light in color—low in odor—extremely economical—excellent for export.



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Distributors' Inquiries Invited

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IN CANADA: Delta Chemical Works Corp., Brantford, Ont.

IN MEXICO: Icon, S. A., Mexico, D. F.

For High Quality in Your End Products... Use

HOOKER HIGH QUALITY TOLUENE DERIVATIVES

When you want a high quality product from your reactions with toluene derivatives, you will find no better assurance than by using Hooker Benzoyl Chloride, Hooker Benzyl Chloride or one of the other Hooker products.

Years of experience in chlorination techniques plus high purity chlorine from the Hooker "S" Cell and carefully selected raw materials, make these Hooker intermediates the highest quality obtainable. Ten Hooker toluene derivatives provide you with a choice that will best meet your requirements from the standpoint of end product desired, ease of handling, yield and cost.

Listed below are the principal properties and uses of Hooker Benzoyl Chloride and Hooker Benzyl Chloride—most widely used of the Hooker toluene derivatives. Technical Data Sheets and samples are available to qualified personnel when requested on your letterhead. Bulletin 320, also supplied on request, gives more detailed information on the reactions of these Hooker products.

BENZOYL CHLORIDE

Formula	C_6H_5COCl
Molecular Weight	140.5
Freezing Point	-0.9°C
Boiling Point	198°C
Refractive Index $n_{20/D}$	1.5536
Flash Point	72°C
Fire Point	85°C
Specific Gravity, 15.5°/15.5°C	1.219

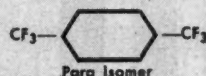
DESCRIPTION

Colorless liquid possessing a pungent characteristic odor; it fumes when exposed to moist air.

USES

Benzoyl Chloride is a highly active chemical which can be used to introduce the benzoyl group into organic compounds, especially through Friedel-Crafts reactions. Other uses are in the manufacture of benzophenone, benzyl benzoates, synthetic perfumes, dyes and pharmaceuticals.

HOOKER RESEARCH PRESENTS BIS(TRIFLUOROMETHYL)BENZENE



Molecular Weight	214.11
Freezing Point	-40° to -50°C
Boiling Point	115°C
Specific Gravity, 20°/15.5°C	1.395
Refractive Index, $n_{20/D}$	1.379

Hooker Bis(trifluoromethyl)benzene (xylene hexafluoride) is a clear, water white liquid. The product, a mixture of the meta and para isomers, is currently available in pilot plant quantities. A study of the literature indicates that it is of interest as a chemical intermediate in the preparation of dyestuffs and in the preparation of non-flammable dielectric and hydraulic fluids.

Technical Data Sheet No. 368 gives physical and chemical characteristics. Literature and samples are available to qualified personnel when requested on your business letterhead.

BENZYL CHLORIDE

Synonym	Alphachlorotoluene
Formula	$C_6H_5CH_2Cl$
Molecular Weight	126.5
Freezing Point	-43°C
Distillation Range	5° or less including 179.4°C
Refractive Index, $n_{25/D}$	1.5365
Specific Gravity, 15.5°/15.5°C	1.107

DESCRIPTION

Colorless to light yellow liquid having a pungent odor. The above data are for the high grade product. Also available as a technical grade with a wider distillation range.

USES

In manufacture of intermediates, dyestuffs, perfume bases, plasticizers, resins, wetting agents, rubber accelerators, gasoline gum inhibitors, pharmaceuticals.

OTHER HOOKER TOLUENE DERIVATIVES

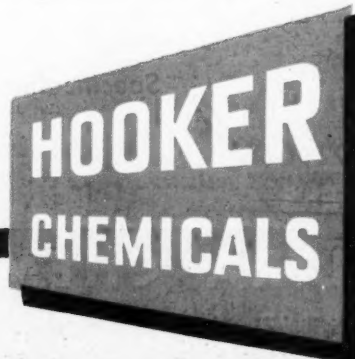
BENZYL ALCOHOL, TECH. • BENZOIC ACID • BENZOIC ANHYDRIDE • BENZOTRICHLORIDE • BENZYL THIOCYANATE • METHYL BENZOATE • MONOCHLOROTOLUENE • SODIUM BENZOATE

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The fume-handling parts of Durco fans are made entirely of an alloy which withstands corrosion. This alloy can be Duriron, Durichlor or Durimet 20 depending upon the service.

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or sulfuric acid, sulfur dioxide and hydrofluoric acid.

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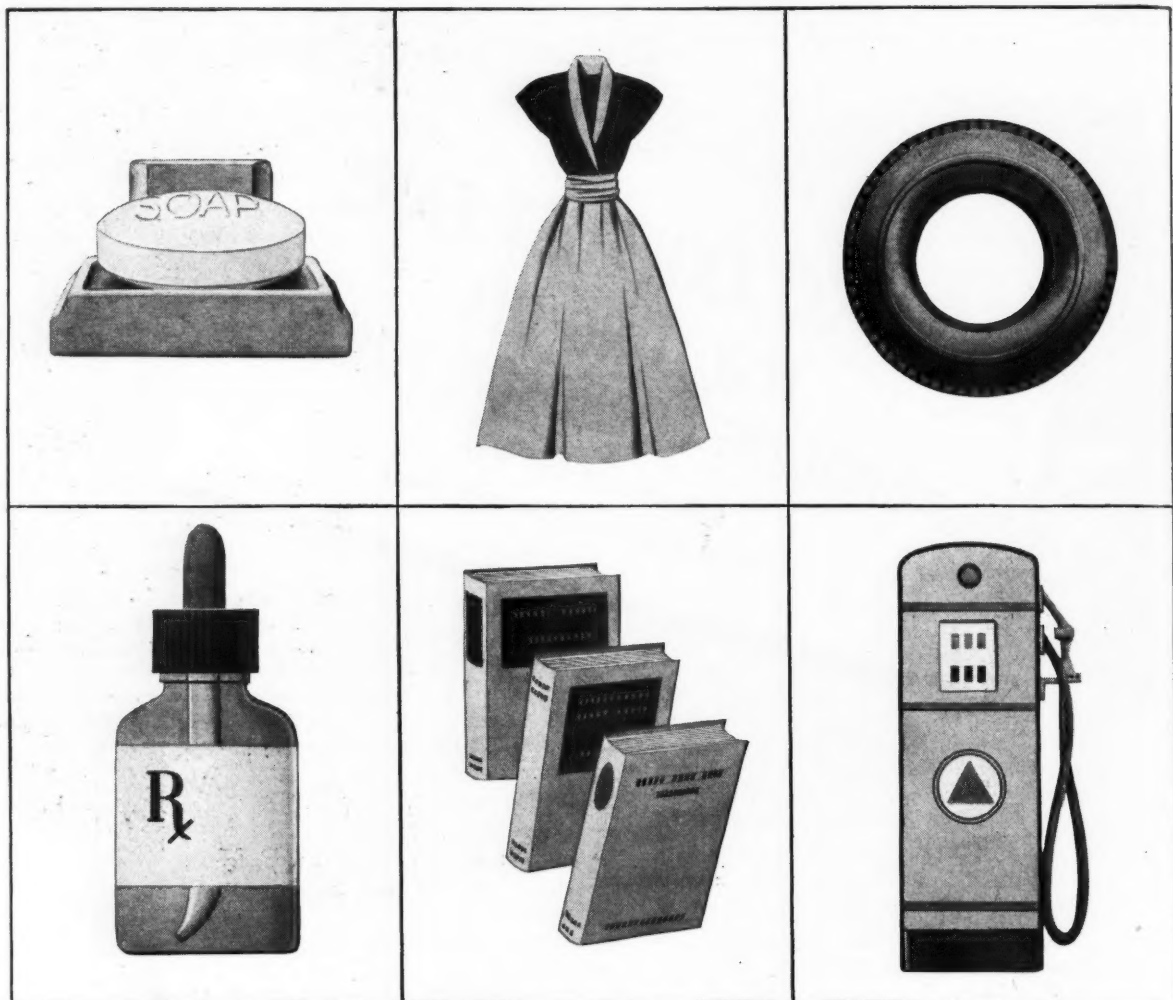
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This and other grades of Wyandotte Caustic Soda go into the processing of hundreds of chemicals, soap, dyes, foods, textiles, vegetable oils, pulp and paper, pharmaceuticals, rubber, cleaning compounds, petroleum, photographic chemicals and countless other products.

No matter what your Caustic Soda requirements may be, you can rely on Wyandotte for prompt, dependable deliveries — together with any technical assistance you may need.

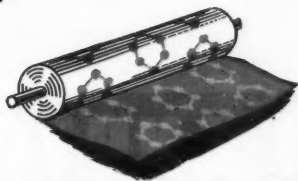
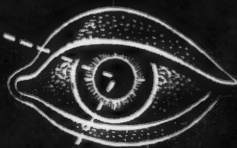
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TEXTILE INDUSTRY
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AMMONIUM THIOCYANATE
 (Sulfocyanate)



What makes Baker's Ammonium Sulfocyanate so popular in the Textile Industry?

There are at least ten reasons—but basically it starts with one factor—Baker's raw materials in themselves are better than 99.7 per cent pure! And each Baker Thiocyanate is an all synthetic product.

That means you get a chemical that is colorless, clear, white and with a sparkling crystalline structure, rather than the usual cream-colored product.

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It means Baker's Ammonium Thiocyanate never becomes "sloppy." Baker ships in a fiber moisture-resistant drum with friction cover-tops rather than in the conventional wooden barrel, to safeguard against atmospheric moisture.

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Whether you use Ammonium Thiocyanate (Sulfocyanate) as an ingredient in printing paste—or a catalyst for the polymerization of resins—you'll want to sample Baker's and compare! We urge to you to write for test sample and prices. Address: J. T. Baker Chemical Co., *Executive Offices and Plant*, Phillipsburg, N. J.



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The New 1949 B & A CATALOG

*2093 Potassium Bisulfate, Fused Lump, Reagent, A.C.S.

Acidity (as H ₂ SO ₄)	35-37%	1 lb. seb.	.55 lb.
MAXIMUM LIMIT OF IMPURITIES		5 lb. seb.	.80 lb.
Insoluble and NH ₄ OH ppt.	0.010 %	25 lb. drum	.41 lb.
Cl	0.002 %	2 x 25 lb. @ 1c lb. less	
PO ₄	0.005 %		
Ca and Mg ppt.	0.005 %		
As	0.002 %		
Fe	0.002 %		
Heavy Metals (as Pb)	0.001 %		

CODES 2093 & 2094

This product is a combination of Pyrosulfate (approximately 40%) and Bisulfate. This amount of Pyrosulfate is desirable to eliminate splattering in fusions. For best results in the laboratory insist on B&A "A.C.S." quality.

*2094 Potassium Bisulfate, Fused Powder, Reagent, A.C.S.

Acidity (as H ₂ SO ₄)	35-37%	1 lb. seb.	.93 lb.
MAXIMUM LIMIT OF IMPURITIES		5 lb. seb.	.85 lb.
Insoluble and NH ₄ OH ppt.	0.010 %	25 lb. PBL drum	.44 lb.
Cl	0.002 %	2 x 25 lb. @ 1c lb. less	
PO ₄	0.005 %		
Ca and Mg ppt.	0.005 %		
As	0.002 %		
Fe	0.002 %		
Heavy Metals (as Pb)	0.001 %		

*2096 Potassium Bisulfate, Meta, Cryst., Reagent

H ₂ SO ₄	M.W. 222.31	1 lb. seb.	.73 lb.
Assay (K ₂ SO ₄)	85-91%	5 lb. seb.	.65 lb.
MAXIMUM LIMIT OF IMPURITIES		25 lb. PBL drum	.48 lb.
Insoluble	0.005 %	2 x 25 lb. @ 1c lb. less	
Cl	0.002 %		
Pb	0.001 %		
Heavy Metals (as Pb)	0.001 %		
As	0.001 %		

This reagent has an equivalent SO₃ value of about 54%.

B & A STOCKS AT CONVENIENT LOCATIONS

LABORATORY CHEMICALS

THE "PBL" DRUM

For numerous products in this listing of B&A chemicals, a "PBL" Drum is indicated as a 25-lb. package size. This is a sturdy fibre drum with a Polythene Bag Liner used for "difficult" chemicals.

The "PBL" Drum is used for a group of chemicals which heretofore have been packaged in glass jars. In addition, its use has been extended to another group of chemicals for which B&A considers fibre drums with ordinary liners to be less than adequate.

ECONOMICAL:
Extremely light tare weights reduce transportation expenses to the minimum.

STRONGER... DURABLE:
Drums made of extra-strong, water-proofed fibre for heavy duty service. Special construction features provide security from loss through breakage.

PURITY PROTECTION:
Polythene bag insert is clean, chemically inert to the contents, and seals tightly. It aids in bringing the product to the user in same fine condition as when produced; also helps keep it "factory fresh" in storage. Weighs "it" moisture pick-up, caking, dusting, or spilling is minimized.

COMPLETE CLOSURE:
Multi-fold bag top plus deep-shoulder cover of drum make possible tight, contamination-proof reclosure after the drum has been opened.

For entire information, see how the "PBL" Drum is different from other fibre drums. Write Baker & Adamson, New York 6, N. Y.

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This valuable book also contains full data on B&A's outstanding packages...

features that are not to be found anywhere else. Gives just the type of information you want on the new B&A "PBL" Drum, the "Saftepak," the 6½ gal. carboy, 9-bottle case, etc.

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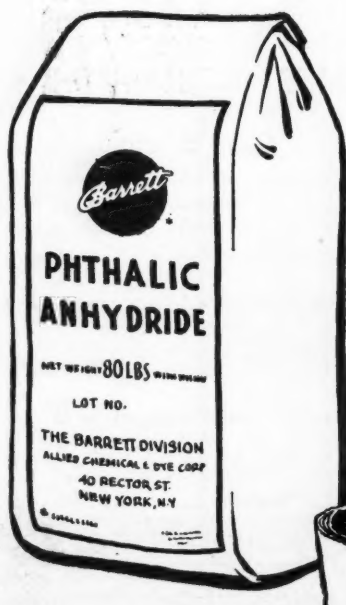
Resin manufacturers appreciate the operating economies that are made possible through the use of Barrett phthalic anhydride.

Barrett phthalic anhydride is available in 5-ply paper bags which assure adequate protection. The uniform weight of 80 lbs. in each bag may be used as the unit in formulation, and the phthalic anhydride can be fed directly into the processing equipment, thus cutting time of weighing or measuring.

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insures adequate
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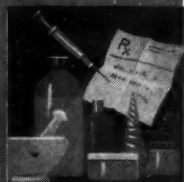
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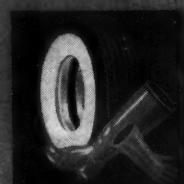
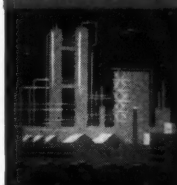
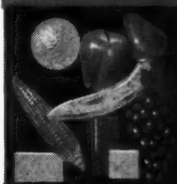
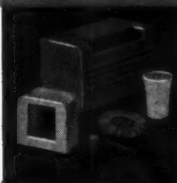
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PAINTS AND VARNISHES

Pine oils are used in the paint and varnish making industries as special solvents in alkyd and phenolic resin formulations, as wetting agents and levelers for baked enamels, dispersants for grinding pigments, and as anti-skinning agents. Pine oil is also used as a preservative, wetting agent, and anti-foam agent in casein—and water-emulsion paints.



DISINFECTANTS

High in terpene alcohol content, Hercules Pine Oils are widely used in disinfectants. They are effective, low in cost, safe and easy to use, have a pleasing piney fragrance, long-lasting disinfectant action, do not stain.



MINING

In the mining industry, Hercules Pine Oils are used as frothing reagents in the flotation process. Low in cost, pine oils are effective frothers for the flotation of sulphide minerals—especially where a highly mineralized froth is required. Pine oils are also employed in the flotation of coal, potassium chloride, and talc.



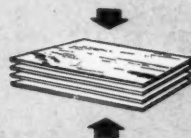
PAPER

Pine oils diverse properties are responsible for their wide acceptance in the paper industry. They are used as anti-frothers, casein preservers, and as wetters and spreaders in coating operations.

HERCULES

PINE OILS

IMPROVE
MANY PROCESSES
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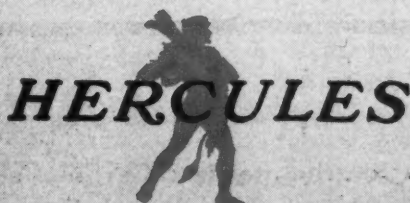


PLYWOOD ADHESIVES

Pine oils are used as anti-foaming agents, wetting agents, and protein preservatives in plywood adhesives. They perform a similar function in adhesives based on glue, casein, and starch.

YOUR INDUSTRY

Hercules Pine Oils have application in many other industries, such as the textile, soap, cleaners, drug, leather, rubber, and laundry industries. Possibly pine oils have new and desirable applications in your industry? Why not send for literature and testing sample?



HERCULES POWDER COMPANY
INCORPORATED
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Please send me information and testing samples of pine oils for evaluation in _____

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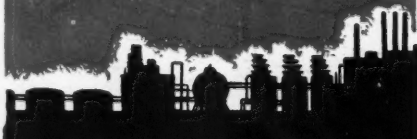
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HP-1

4 reasons
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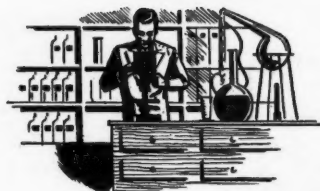
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Highest specification material, acetone purity over 99.5%; APHA color less than 10. This uniformity means you can *standardize* on formulations and processes.

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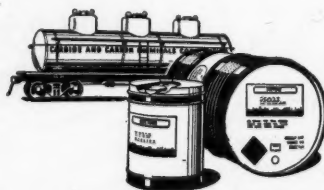
Excellent odor, resulting from high purity, means a *more desirable* denaturant for alcohol formulas, more saleable consumer products.

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Available in the quantities best suited to fit your unloading and storage facilities—single drums, drum carloads, compartment tank cars or tank cars. And you can economize by purchasing acetone in compartment cars with other Carbide products.

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Chemical Industries

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

Newsletter,
April, 1949

For Your Information:

First unit of Westvaco Chemical Division's elemental phosphorus plant at Pocatello, Idaho (CI, June 1948, p. 908), is expected to be in operation by June 1; the second, early in 1950. Size of the project is indicated by the estimated ultimate annual cost—slightly under \$1 million—of power, to be purchased from the Idaho Power Co.

Chlorine users will be interested in the outcome of a proposal made to the Official Classification Committee of the railroads to adjust chlorine freight rates downward in the eastern part of the U. S. north of the Ohio River. The proposed adjustment would change the present rating and reduce transportation costs by almost 40 per cent.

* * CI * *

Floz-On Manufacturing Co. has called off its plans to make ethylene glycol catalytically from natural gas and steam. It has been revealed that independent investigators have failed to substantiate claims made by the inventor of the process.

The first Hypersorption plant for separation of propylene from hydrocarbon gases is being constructed for Standard Oil Co. of California at Richmond, Cal. Ethylene and very pure methane are the products of the two Hypersorption units already built for other companies.

* * CI * *

The Industrial Research Department of Washington State College is working on the adaptation of fruit and canning industry wastes as raw material for a mobile distillery unit to produce alcohol. The work is being financed by Jos. E. Seagram & Sons Co.

Natural gas for the Pacific Northwest appears to be nearing reality. Watch for word later this year on an application recently placed before the Canadian Government by the Northwest Natural Gas Co. for a license to export gas from the Alberta fields to the U. S. Hearings before a Royal Commission have just been completed. If the license is granted, the plan is to run a 24", 220-million-cu.-ft. per-day pipeline from a collecting point at McCleod, Alberta, down through Idaho and west to Spokane and Seattle, and spur lines from there to

Vancouver and Portland. Preliminary contracts for supplying the gas have already been made with Imperial Oil, Shell, and Standard of California, all of whom have operations in the Alberta fields. Financing is being arranged for through the New York underwriting houses of Dominick & Dominick, W. C. Langley & Co., and Morgan Stanley & Co.

* * CI * *

Of particular interest in view of reports that Du Pont will use butadiene and chlorine as nylon raw materials at its new Victoria, Texas, plant is U. S. Patent 2,462,388. The patent discloses the formation of 1.4-dicyanobutene-2 by reaction of an alkali-metal cyanide with the dichloro addition product of butadiene. Exhaustive hydrogenation of the dicyano derivative is a possible route to hexamethylene diamine; partial hydrogenation followed by hydrolysis (or vice versa), on the other hand, would give adipic acid.

The promising new antibiotic, neomycin, is now in the hands of all streptomycin producers. The culture—which yields the germ-killer—and the standard preparation—which enables comparative tests to be made—were given to them by Selman Waksman, Rutgers University, discoverer of both drugs. Although it is too early to be certain, neomycin seems as good as or better than streptomycin in combatting tuberculosis. In vitro, germs do not develop resistance upon continued contact with the antibiotic. It is especially effective against streptomycin-resistant strains.

* * CI * *

Department of Agriculture scientists at the Southern Regional Research Laboratory, New Orleans, have applied for a public-service patent on synthetic fibers made from carboxymethyl cellulose salts of such metals as sodium, lead, copper, and aluminum. The fibers, like the alginic acid fibers produced in England, are alkali-soluble. Thus they may be combined with ordinary fibers as a temporary reinforcement during weaving and then simply removed by a dilute alkali wash. Such usage results in sheer, lace-like fabrics and makes possible weaving of designs and combinations which are not practical by other means.

Procter & Gamble's new liquid household detergent, Joy, primary use of which is in dishwashing, is being test-marketed in Buffalo, N. Y., and St. Louis, Mo.

* * CI * *

Here and There:

Preliminary operations are now under way at Stanton Chemicals' Corpus Christi plant...A co-dyeing agent developed by Celanese Corp. is said to substantially increase the fastness of many existing dye-stuffs...Public acceptance of automobile chassis undercoatings has increased to the point where there are now some sixty makers of these mainly rubber- or asphalt-base materials...A new red iron oxide pigment made semi-commercially by the Minnesota Mining & Mfg. Co. is claimed to derive high color purity from uniformity of particle shape and size.

The Editors

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Buyers who went through the shortage of Phthalic learned the *plus* value of a dependable source of supply. Koppers customers profited from the *plus* value of delivery of Phthalic as promised.

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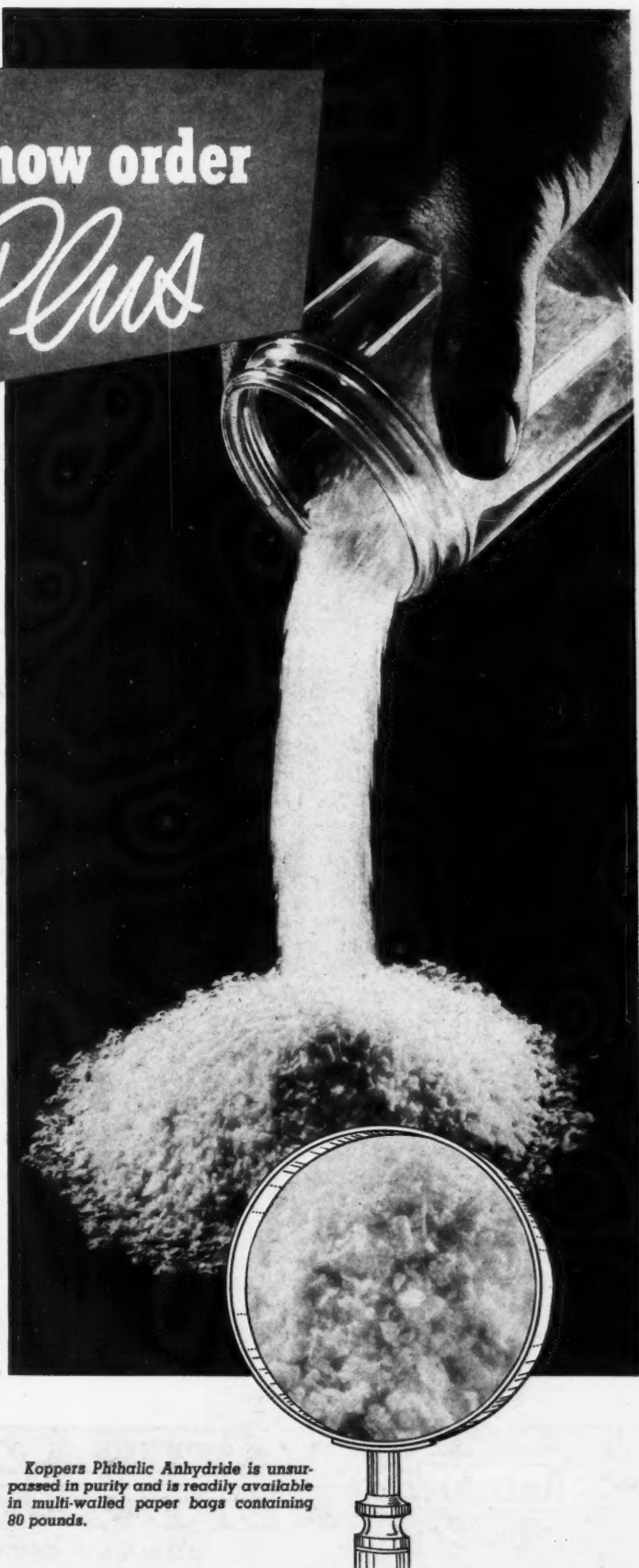


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JERSEY CITY, NEW JERSEY

WHOSE RESPONSIBILITY?

by ROBERT L. TAYLOR, Editor

RECENT WIDELY-PUBLICIZED EVIDENCE indicates that the mysterious "virus X" disease that has been so prevalent during the past several years may actually be DDT poisoning. This brings up again the important question of the manufacturer's responsibility in introducing a new toxic material for general use.

At the recent American Chemical Society meeting in San Francisco, where the DDT matter was discussed, medical spokesmen sharply criticized manufacturers who have "placed powerful pesticides on the market for general use before compiling full information about their toxicity." The implication was that manufacturers of DDT had not gone far enough in their determination of toxicity data, or, if they had, that they had not done an adequate job of getting it into the hands of users.

Either charge is a serious one. We do not know to what degree they are justified, if at all. But we do feel certain that whatever the outcome of any investigations that are made, public confidence in DDT, and perhaps in some of its makers, is not likely to be as high as it was before. Already some of our non-chemical friends have expressed concern that "the companies would let anything like that get onto the market," not stopping to think that a number of more hazardous materials are used safely by thousands every day.

The importance to the chemical industry of cases of this kind, regardless of who is actually to blame (if, indeed, anyone in this instance) is that the onus inevitably falls on the manufacturer and on the product itself. And the public has a long memory. Once doubt is cast on the safety of a product, the regaining of confidence is generally a long, up-hill fight. Some of the early struggles of saccharin, carbon tetrachloride cleaning fluids and aluminum cooking utensils are still vivid in the memories of many. In all of these cases prejudices were set up in the public mind by exaggerated or entirely unfounded "poison" scares.

As the rate and productivity of chemical research continue to increase, there will be more new products coming from the laboratories that show great potential benefit and utility but which also indicate toxicity hazards if not properly used. It must be the responsibility of all

chemical manufacturers to take infinite pains to see that such products are properly identified. They must make equally certain that customers are aware of the nature of the material and of limitations placed on its use by the factor of toxicity. Although manufacturers of chemicals normally have no control over the way in which their materials are put to work, cases have been known where orders for a hazardous product were accepted only upon evidence that the material would be used in the manner recommended.

The importance of toxicological evaluation of new products was emphasized only recently in a half-day session devoted to the subject by the Commercial Chemical Development Association. There it was indicated that in many companies some such evaluation is already routine.

The accumulation of toxicological data is an expensive and frequently time-consuming job, but the day has long since passed when it can be considered as anything but an essential part of the task of introducing a new chemical product. It cannot be by-passed or skimmed over. There is no surer way of retarding the progress and good that is being accomplished through the development of new synthetic chemicals than to permit any risk that is likely to destroy the public's faith in such materials.

Willard Henry Dow

THE UNTIMELY DEATH of Willard Dow on March 31 brought to a close the life of one of this country's most illustrious chemical industrialists.

As president of the chemical company bearing his name, Dr. Dow had been the spark plug of one of the pace-setters in the great forward strides made by the American chemical industry during the past decade.

He personally supplied much of the drive and enthusiasm that carried the seawater magnesium process over the many obstacles that appeared in its early path. The Dow company's pioneering in styrene, phenol and many other organic chemicals bore the marks of the direct interest of its president.

The example set by Willard Dow is one that may well be emulated by coming generations of chemical managers.

Antara Products
a division of
General Aniline &
Film Corp.

Antara Extra

An Antara Products Publication

Detergents
Emulsifiers
Wetting Agents
Dispersants
Carbonyl Iron Powder

444 MADISON AVENUE

NEW YORK 22, N. Y.

APRIL, 1949

ANTAROX* "A-180" DETERGENT STANDS OUT FOR HARD SURFACE CLEANING

Research and development work completed this month by Antara Products, a division of General Aniline & Film Corp., brings to light the outstanding qualities of Antarox "A-180" as a base of better products for washing all types of hard surfaces.

Among products made possible by Antarox "A-180" are those for washing dishes, glassware, automobiles, painted surfaces, walls, floors, hospitals, dairy equipment and most other applications where the problem of hard surface cleaning arises.

A Non-Ionic Detergent

Antarox "A-180" is a liquid non-ionic product of the aromatic polyglycol ether type, which has good foaming properties, excellent cleansing action and is extremely effective as an emulsifying and dispersing agent. Research and development has revealed that one of the most outstanding applications for Antarox "A-180" is the field of washing hard surfaces. In this field it is superior to soap because it enables the surface to dry with a brilliant unspotted appearance. Antarox "A-180" is outstanding in the field of detergents

because it not only possesses excellent wetting properties but also cleaning properties. Even a very minute concentration of the product remaining on the washed surface after rinsing will lower surface tension to such a degree that water sheets off permitting the wet surface to dry rapidly

Antarox "A-180" possesses excellent detergency and lowers surface tension to about 31 dynes per centimeter at .01 per cent concentration.

For dish washing and many other applications the recommended concentration is 0.05 per cent, however, for washing automobiles the concentration should be raised to 0.10 per cent to insure removal of the more stubborn road films. It has been found advisable in this application not to use excessively hot water.

Full details on Antarox "A-180" are yours for the asking. Write today.



Antarox "A-180" is excellent for cleaning hard surfaces—rubber, marble, tile, porcelain, terrazzo, etc. On applications such as illustrated above, it is far superior to soap powder because of its efficiency and because it cuts down labor costs. A typical solution contains one tablespoonful of Antarox "A-180" in a bucket of water.

* ®

Antarox "A-180" Is 100% Non-Irritating

Antarox "A-180"—a liquid, non-ionic detergent of the aromatic polyglycol ether type—was the only detergent found to be 100% non-irritating to the skin in a test of 12 leading soaps and synthetic detergents made recently by a well-known testing laboratory.* The results of these tests were revealed this month by Antara Products, a division of General Aniline & Film Corp.

Antarox "A-180" was rated 100% non-irritating, and 100% non-sensitizing. All of the 11 other products caused cases of positive skin irritation in varying degrees from 4% to 81%.

The test was carried out according to the approved skin-patch method which has been accepted by soap industries and by government authorities.

During the test Antarox "A-180" was applied directly to the skin of both men and women, thereby assuring complete results.

The final rating in percentage indicated that out of every 100 persons tested, not one of them developed any skin irritation from Antarox "A-180."

*Industrial Toxicology Laboratory



Antara* Products

A DIVISION OF
GENERAL ANILINE & FILM CORPORATION

444 Madison Ave.
New York 22, N. Y.

What's new

UREA TRIPLES IN TWO YEARS

High freight rates, fertilizer demands and protein supplement are three factors that are pushing urea-output skyward.

NOT MANY fifteen-year-oldsters could climb a 45° slope, but that's what urea has done. That's the slope you get, a mathematician would agree, if you plot the index of capacity over the last two years.

During the first fifteen years of synthetic urea's U. S. industrial history (i.e., since 1933) Du Pont was the sole producer. Du Pont's Ammonia Department more than doubled its capacity last year, and within a few months Solvay Process Co., a second producer, expects to complete its plant at South Point, Ohio.

Du Pont's capacity before the recent expansion was well over 100 million pounds a year. This, plus the expansion, plus Solvay's new facilities, should put 1949 capacity at well over 300 million pounds—and that may not be all: At least two other synthetic ammonia producers are seriously considering urea installations.

Father and Son

It's natural that ammonia producers have a hand in urea, for since 1933, the two nitrogen compounds have been father and son. In the current process ammonium carbamate, reaction product of ammonia and extremely pure carbon dioxide, is dehydrated to urea. The reaction is carried out batchwise at somewhat under 200 atmospheres pressure. The overall reaction is a "natural" for synthetic ammonia producers, since the synthesis of ammonia (from natural gas or coal) is accompanied with large by-product of carbon dioxide. This by-product is rarely profitable, for it is either blown out of the stack or converted to such low-unit-value products as dry ice.

While logical from a raw-materials standpoint, urea production has given Du Pont's process engineers many a sleepless night. Obtaining the reactants in high enough purity is one knotty problem, and corrosion is another. The latter is so tough that silver-lined equipment is used for a large portion of the plant.

The first synthetic urea was sold as urea-ammonia liquor, a solution of urea

in aqueous ammonia containing 45 per cent total nitrogen. Crystal urea was not marketed until two years later.

Literally, one shouldn't say the "first synthetic urea," for the first urea synthesis from ammonium cyanate over a century ago broke down the barriers between the classical divisions of organic and inorganic chemistry.

Again speaking literally, 1933 didn't mark the industrial birth of urea, for small quantities were used in the celluloid-collar days as an antiacid and stabilizer for the then-new celluloid plastic. It was made by acid hydrolysis of calcium cyanamide.

Fertilizer

But that was small potatoes compared with today's burgeoning production. Where there's production smoke, there's market fire, and the current feverish combustion is fed by recent developments in

two major fields: fertilizers and livestock feeds.

The major use of fixed nitrogen (except in wartime) is soil fertilization. Until recently the only question involved was the gross amount of usable nitrogen to be added. But now attention is being given to the supply of adequate available nitrogen at the proper time during the plant growth cycle. At present this approach is in its infancy, but it will assume greater importance as time goes on.

One method of quickly providing large quantities of fertilizer nitrogen is through the leaves of the plant by spraying urea solutions onto the leaf surfaces. Du Pont's "Nugreen" urea-containing fertilizer compound is used in this fashion. "Nugreen" can also be dissolved in the insecticide solutions, fertilizing the plants at the same time the insects are killed (*CI, Feb. 1949, p. 198*). Distribution at present is being limited until the efficiency of this method of application has been completely demonstrated on other than apple trees.

"Plastic" Plant Food

Another "controlled-nitrogen" product



DU PONT'S UREA: Twice as much as before.

developed by the U.S. Department of Agriculture is a urea-formaldehyde condensation product (*Ind. Eng. Chem.*, July 1948, p. 1178) containing 36 per cent or more nitrogen with varying degrees of nitrogen availability. This variation is provided by using different molal ratios of formaldehyde to urea and adjusting the degree of condensation. Thus it is possible to produce a nitrogen fertilizer material with a predetermined nitrogen solubility and rate of availability to plants.

The co-production of formaldehyde and methanol at many synthetic ammonia plants makes this form of fertilizer a logical product. Although still in a "pilot-plant" stage, it has aroused much interest and is expected to supply a small but

Replacement of ammonium nitrate with urea is a move that most insurance companies would applaud.

Moreover, it has authoritatively stated that a pound of fertilizer nitrogen as urea or urea compounds can be supplied to the soil as cheaply as in any other form.

Protein Supplement

More urea is expected to find its way into the feed rations of cattle and sheep as a protein supplement. Some estimates place this eventual market in the hundred-million-pound-a-year class. However, at any such estimate is full of ifs, ands, ors, and buts. Even so, no more than half of animal protein requirements can be supplied by urea.



PLANT FOOD: More nitrogen from urea than before. U. S. Soil Conservation Service

sizable portion of the market. How large this will be depends on whether increased control over nitrogen availability will outweigh increased cost.

The extremely high nitrogen content of urea is another factor favoring its introduction as a fertilizer component. Ammonia is the only material among fertilizer materials with less "waste" in the molecule. However, ammonia is a gas and its shipment requires the use of heavy steel cylinders. Although it is being used for direct application either by injection into irrigation water or into the soil at the time of plowing, its use is restricted by the problems of cylinder handling. The high nitrogen content of urea coupled with light-weight packaging adds up to less freight; and less freight means lower cost to the customer. Although most producers shy away from discussion of ammonium nitrate hazards, the fact remains that a mixture of ammonium nitrate and organic material can give a low-order explosion.

Urea can be used as a protein supplement only for cud-chewing livestock; it is not suitable for non-ruminants such as hogs or horses. It must be used in a ration which is low in protein and high in readily assimilable carbohydrate. The ration moreover must have adequate bulking properties. Not more than 3 per cent of urea can be safely added to the feed mixture, and it is best that this percentage be held below 1.5 per cent of the total weight. Another important requirement is admixture of the urea in such a manner that a uniform percentage of urea is found throughout the ration. If local concentration is too high, there is always the possibility not only of injuring the animal, but of killing it.

Such obstacles are far from insurmountable and, granting the ability to overcome them, it appears that the amount of urea used will depend on the price of adding protein to the ration. If urea is the most economic method, it will be used. Again consider freight rates: Urea

is very possibly the highest concentration protein supplement available and, as such, should be of the greatest value when the protein content of the food ration must be shipped from some distance.

Other Uses

A variety of non-agricultural uses currently accounts for much urea consumption, but the quantity is either declining or static. Largest consumption is in the form of urea-formaldehyde condensation products, which are used as plastic molding compounds, adhesives, resin additives for high wet-strength paper, and the like.

Urea-formaldehyde molding compounds account for some 20 million pounds of urea each year. This, however, very likely represents a temporary demand peak and recently smaller quantities have been moving into this field. They are up against stiff competition from polystyrene for molding and from melamines for certain specialty uses.

Urea-formaldehyde adhesives provide a bright spot. Consumption of urea for this use is expected to expand over the long run. Expansion is predicated upon high production of internal plywood; and since that in turn depends upon lower prices, the low cost of the urea-formaldehyde adhesives is one of their strongest selling points. Bonus advantage: They are water-white.

Use of large quantities of urea-formaldehyde condensation products for high wet-strength paper has been glowingly predicted. But it seems evident that the number of uses where high wet strength is sufficiently desirable to justify the increased cost is quite limited.

Melamines seem to be ahead in the battle for the textile market. Although initial cost on a poundage basis is much higher, fewer pounds are required and in most cases they are believed to give better results. Small quantities go into coatings and other chemicals, but nothing is on the horizon that promises great expansion here.

Prognosis

Even though some of the older uses are dwindling, urea stands to gain from new fundamental knowledge of plant and animal nutrition and achieve—in these new directions—unprecedented importance.

BETTER THAN DDT?

• SOME NITROPARAFFIN derivatives are safer and more potent insecticides than DDT, Dr. Henry Hass, formerly of Purdue University, reported to the recent American Chemical Society meeting at San Francisco. They are 1,1-(bis)-*p*-chlorophenyl-2-nitrobutane and the corresponding nitropropane derivative.

BENZOATED ALKYDS

New, cheap benzoic acid permits its incorporation in alkyd resins.

THE VALUE of benzoic acid in conferring certain desirable properties on alkyd resins has long been known, but benzoic's relatively high price has always been a deterrent to wide use.

Now Monsanto Chemical Co. has come up with an idea that is fantastically logical: Since benzoic acid is made by decarboxylation of phthalic acid and therefore contains phthalic anhydride as the chief contaminant, and since alkyd resins employ phthalic anhydride anyhow, why go to the expense of purifying the benzoic? The issue of that happy thought is Benthall, a cheaper grade of benzoic acid intended for alkyd manufacture, containing 5 per cent phthalic anhydride. It sells for 29¢ a pound (large lots) compared with 43¢ for technical benzoic acid.

Reduces Acid Value

Benzoic acid is particularly useful for oil-modified alkyds, where a rapid reaction often results in a high acid value. Benzoic, replacing 3 to 20 per cent of the phthalic, gives a slower-bodying mix, permits longer processing time in order to reduce the acid value. The benzoic ester acts, moreover, as an internal plasticizer, thus improves the flexibility and adhesion of the dried film.

In addition to these advantages, benzoic is claimed to improve color, flow properties, and stability; retards heat-yellowing and subsequent bodying; and reduces viscosity. It does not affect air-drying or baking, nor does it affect the resistance of the dried film to water and chemicals.

Other Types Gain

In a typical trial run a glycerine-



BENTHALL FLAKER: Fantastically logical.

phthalic alkyd modified by raw castor oil was first made without Benthall and then with 10 per cent of the phthalic replaced by Benthall. The former resin had a processing time (at 480° F.) of 60 minutes, and an acid value of 22. The latter's processing time was 210 minutes, its acid value 7.2. Viscosity (50 per cent xylol) and Sward hardness (70 alkyd: 30 melamine) were the same; color of the Benthall-containing was slightly better.

Comparable results were obtained in other formulations, with a variety of polyhydric alcohols, dibasic acids, and modifying oils.

ACRYLEATHER

Leather impregnated with acrylics or other polymers resist abrasion better, absorb less water.

MARCHING soldiers and gasoline-short civilians burned up a lot of shoe leather during the war. The tanning industry couldn't keep up with the demand because of the acute shortages of hides and tanning agents—especially quebracho and other vegetable tannins.

Many laboratories, including the National Bureau of Standards, came to the rescue, and the latter organization developed several oil and wax treatments that were adopted by the armed forces to increase shoe wear. But during this work an even better idea slowly took shape: impregnation of the leather with polymers.

Bureau scientists looked into this possibility, and now Rene Oehler and Timothy J. Kilduff, of NBS's leather laboratory, have come up with a promising resin treatment. In addition to increasing the abrasion resistance, the use of synthetic resins reduces water absorption and should cut the amount of tanning materials now required to produce high-quality leather.

Success of the resin treatments, coupled with the knowledge gained in their development, has suggested the possibility of a similar leather treatment using rubber. Further research is being carried out toward this end.

Three Techniques

Three laboratory methods were developed for treating leather with resins: First, immersing the leather specimens in monomer and subsequently polymerizing within the leather structure. Second, soaking the leather in polymer solutions, which may or may not be elastomers. Third, immersion in a partially polymerized liquid resin which is further polymerized in the leather itself. In connection with the second method, gutta-percha, natural rubbers, synthetic elastomers and



TIMOTHY J. KILDUFF:
More wear, less water.

various acrylate solution-polymers were tried. The third method of impregnation was developed in cooperation with the Thiokol Corp., using Thiokol LP-2.

Abrasion resistance as determined with the NBS abrasion machine—an indication of the wear to be expected of sole leather—is improved approximately 75 per cent for vegetable-tanned crust leather impregnated with *n*-butyl methacrylate monomer, followed by polymerization *in situ*. The abrasive resistance of the untreated crust leather was approximately the same as that of sole leather.

Treatment of vegetable-tanned crust leather with solutions of natural rubber improves abrasion resistance about 50 per cent, while treatment with Thiokol LP-2 improves resistance about 30 per cent. However, treatment of vegetable-tanned crust leather with polybutyl methacrylate solution-polymer showed no improvement in abrasion resistance.

Results of half-hour static water absorption tests reveal a reduction of one-tenth to one-third the amount of water absorbed by untreated leather, depending upon the kind of leather and treatment. Water vapor permeability of treated shoe upper leather is higher than similar leather containing 20 per cent grease.

Next: Rubber

Preliminary research with rubber solutions has shown that, by proper choice of processing methods, as much as 20 per cent of rubber can be deposited within unfinished vegetable-tanned leather. The process may be satisfactorily applied to several different types of leather. Dynamic, or wet-flex, water absorption and water transmission of sole leather as well as abrasion resistance are all improved about 50 per cent by rubber treatments. Solutions of natural rubbers having 40 per cent or more of rubber are prepared

from cold milled rubbers and conventional solvents. The impregnated rubber may be vulcanized in place by the use of an ultra accelerator of the dithiocarbamate type.

Service tests on shoe soles and larger-size processing runs are planned as the next step in the investigation.

RUBBER PIPE CINCH

For the first time rubber-lined pipe can be cut and assembled as quickly as an ordinary cold water line.

AFTER three years' work, Gates Engineering Co., New Castle, Del., has developed a means of cutting rubber-lined pipe at any point in the line and rejoining it, thus greatly simplifying both assembly and maintenance of rubber-lined systems. No longer is it necessary to design the system, fabricate the pipe, usually with welded or screwed-on flanges, and, then line with rubber before shipping to the user. With the new method, a rubber-lined piping system can now be assembled in the same manner as any other piping system—from fittings, flanges, and rubber-lined pipe.

Add Adapter

Although the Gates piping system can be supplied in the usual precut manner, it can be cut on the job by use of special adapter fittings on standard pipe-cutting machines. According to the manufac-

turer, the counterboring and grooving operation takes only two minutes, and the joint, capable of withstanding a hydrostatic pressure of 1,300 p.s.i., can be made in less than a minute.

Pipe is furnished in twenty-foot lengths, and the fittings are manufactured by Tube Turns, Inc. Throw-away rubber end caps are used and the key rings used in the grooves (see accompanying chart) are shipped and packed flat.

The lining is a special formula hard rubber, which will withstand 212° F. It is resistant to almost all acids and alkalis.

POWER PACKERS

Connecticut Chemical Research finds that sales spurt when chemical specialties are packaged as aerosols.

AEROSOLS have been generally identified with insecticides since the "bug bomb" became the most important weapon in many a GI's life. In bringing aerosols into postwar homes, manufacturers naturally concentrated on insecticides and seemed to forget that the new dispensing technique could be applied to other products.

Recently air deodorants (*CI, Jan. 1949, p. 30*) and plastic sprays have pointed out likely avenues of expansion for aerosols. Outstanding examples of their vast potential in chemical specialties, however, is the "Packaged Power" line of Connecticut Chemical Research Corp., Bridge-

port, Conn., which boasts in addition to Hep, its first product (an insecticide), a plastic spray, an air conditioner, an insecticidal aerosol, a fire extinguisher, and a mothproofener. Moreover, the company has many more products in the works to keep it out front in this highly competitive business.

Winning Combination

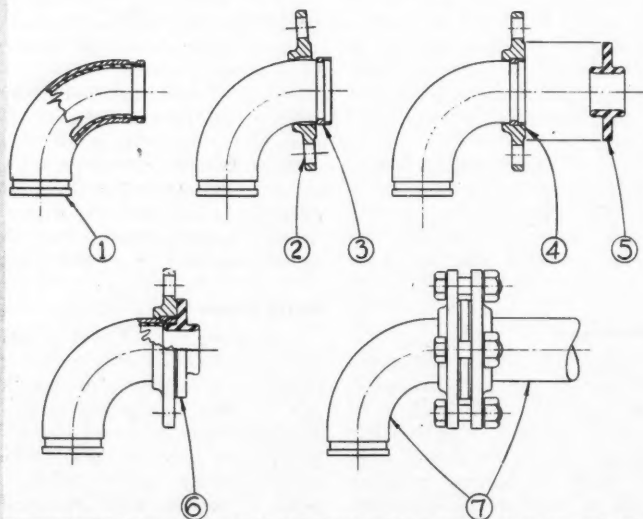
Key to the Connecticut company's rapid rise (it was organized early in 1947) is its approach to aerosols: It offers to combine its knowledge of the technique with other companies' information on products that are good prospects for "canning." This has proved mutually beneficial, for it reduces research and development time to a minimum, and rapidly opens up new markets for the chemicals of cooperating manufacturers. Moreover, companies with established marketing outlets can add new private label products to their lines without large capital investment in equipment and personnel.

When the company was first formed, it planned to exploit the possibilities of aerosols on a research and engineering level to furnish specialties companies with private-label products. H. R. "Shep" Shepherd, who had been assistant to the director of aerosol research for Bridgeport Brass Co. and is now vice-president in charge of research for Connecticut Chemical, scheduled an insecticide for the maiden venture. As production began, the company decided to enter the retail market itself and organized a sales subsidiary, Bostwick Laboratories, Inc., which brought the low-pressure aerosol out as Hep. This corporate structure still prevails, and while the parent company packages its line for various companies, Bostwick also distributes the items under its own trade names.

Surfasol Moth Proofer

The Bostwick Moth Proofer is one of the newest and most novel of the company's products. It is a formulation containing 5 per cent methoxychlor, Du Pont's analog of DDT that is less toxic than the older insecticide. Strictly speaking, the product is not an aerosol but a surfasol, since the particles have sufficient mass to give them directional travel as in the case of a paint spray, whereas an ordinary aerosol would be dissipated into the atmosphere. It kills moths in all three stages (egg, larvae and adult), providing protection to wool for a full year if the article is not cleaned in that time.

This product illustrates the company's alertness to marketing possibilities as well as the advantages of its "joint development" program. It felt that a mothproofener that could be applied to a three-piece suit in 2½ minutes by pressing a



PIPE ASSEMBLY: 1. Elbow (tee, etc.). 2. Place flange on elbow. 3. Insert locking section. 4. Pull flange over locking. 5. Insert rubber adapter. 6. Use same method of assembly on opposite parts. 7. Bolt both assemblies together, completing joint.



AEROSOL MOTHPROOFER: The button wins her.

button would win favor with housewives who have had to spend a half hour or more (and much energy) spraying the same garment with conventional silicofluoride solutions from a pump-type dispenser. Du Pont's experience with methoxychlor led, in a short time, to a good formulation with an attractive cedar scent, and the attack on moths (and consumers) is now under way. A 12-ounce can sells for \$1.95.

Methoxychlor is also the new wrinkle in the Bostwick Super Aerosol. Whereas most insecticide aerosols contain 2 per cent DDT, this formulation contains 1 per cent DDT and 1 per cent methoxychlor along with pyrethrum. This methoxychlor is being pushed as the "plus factor" in this \$1.49 retail item.

Air Conditioner

Bostwick is apparently following rather than setting a trend with its Air Conditioner, for it has coined the name Valium for its active component. (Metazene is the name Kilgore Chemicals, Inc., attached to the active chemical in its formulation, sold by Boyle-Midway as Silver Label Spray Deodorizer.) The company claims that this composition removes malodorous molecules by adsorption and absorption and does not merely mask odors. A scent is added for customer appeal, however. Under normal conditions, the air is purified within two seconds. A \$1.69 aerosol of standard size will provide 225 such treatments.

The new product is the outgrowth of a year of research by Dr. L. H. Beck, of Yale University, and Shepherd on deodorization. During the course of the work, an apparatus for evaluating odors, called the Bostwick Odorometer, was de-

veloped. This and other discoveries in the field of osmics will be reported in future publications by these two researchers.

Plastic Spray

The present line of push-button specialties is rounded out by a Clear Plastic Spray and Hero Fire Extinguisher (*CI, Feb. 1949, p. 205*). A transparent flexible protective coating can be applied by the spray to all types of surfaces. Tools, golf clubs, silver, luggage, diplomas and pictures are but a few of the possible targets in the home. In industry, the number of articles that can conveniently be protected from wear and corrosion by this method may be even larger. A can of plastic and a bottle of solvent to remove it sell for \$1.95 when purchased as a unit.

Hero, the pressurized fire extinguisher, represents the company's efforts to capture the practically virgin market that exists for a small cheap extinguisher. At \$1.29 this container of carbonated carbon tetrachloride is selling well enough to make this specialty another tonnage consumer of chemicals.

On the Docket

Although Connecticut Chemical Research has about the most complete line of aerosol products offered by any company, development work has been carried out on several more that will soon be introduced. An automobile wax, a shoe polish and a furniture wax will attempt to eliminate some of the rub in using these polishes. Touch-up paint in several colors is another on the schedule, as is a self-dispensing fur dusterizer (a cleaning agent for the fur trade). Twelve-ounce fungicidal and insecticidal aerosols for the greenhouse trade will be pushed as a replacement for 5-pound units now being used. Flexibility and uniformity of control will be the big selling features. A variety of toiletries, cosmetics and pharmaceuticals should be forthcoming from work now being carried on with companies in these fields.

How long the list of chemical specialty aerosols grows will be determined by the consumers' willingness to pay for the convenience of this method of application. The American public likes gadgets, and so far has taken kindly to the aerosols that have been offered it. Undoubtedly, many people have bought items in this form who wouldn't have purchased them otherwise, and in that respect the overall market has been broadened. Connecticut Chemical Research, confident that power in a package means power in sales, is one outfit betting that the trend will continue.

INTO THE FIRE

Soot and slag removed chemically from the furnace side of industrial boilers.

GOING from the frying pan into the fire usually ends in disaster. But when the National Aluminate Corp., a Chicago firm in the water treatment business for over 20 years, decided to take a look at the furnace side of boiler tubes, it came up with a soot remover that has received an enthusiastic reception from industrial plant operators.

The product, Nalco SR-150, is the result of research on chemical removal of soot and slag from boiler furnaces carried on for the company, at the Battelle Memorial Institute, Columbus, O. Since field tests in a few plants were completed about six months ago, it has been widely sold to industrial consumers. More recently, a liquid product, Nalco SR-155, has been developed for use in oil-burning equipment, and this is being recommended where the dry SR-150 can't be fed successfully.

Heat Robbers

Soot from incomplete fuel combustion and slag from coal ash commonly prevent good heat exchange in boilers by building up on and insulating boiler tubes and superheater elements. Streams of high-pressure air or steam have been used for removal of such materials, but these are expensive and are often unsatisfactory for small boilers.

Chemical compounds thrown on the fire, added to the coal before firing, or sprayed into the furnace have been tried in place of mechanical cleaning methods. Common salt and old dry batteries containing zinc have been used, and proprietary compounds based on similar formulations have been sold.

Untreated soot burns at about 1,135° F., and if the temperature of flue gases is above this, no soot is deposited provided there is enough oxygen to support combustion and sufficient time for burning. Since the temperature is usually lower than this in regions of soot deposit, a soot remover should change the character of the soot to enable it to burn at a lower temperature.

Cupric Chloride Best

Previous research by the U. S. Bureau of Mines (Bulletin 360, 1932) had showed that chlorides in particular act as catalysts to reduce the ignition of soot, cupric chloride being the best, with lead chloride, nickel chloride, stannous chloride and zinc chloride less effective in that order. Oxides or other salts of the same metals have increased effectiveness when mixed

with common salt, but results are not uniform.

Efficiency of these materials depends upon their ability to volatilize from the fire bed and form satisfactory deposits on the soot. Enough oxygen must be present in flue gases to burn the treated soot, but addition of nitrates, chlorates, and similar oxygen-bearing salts does not increase effectiveness.

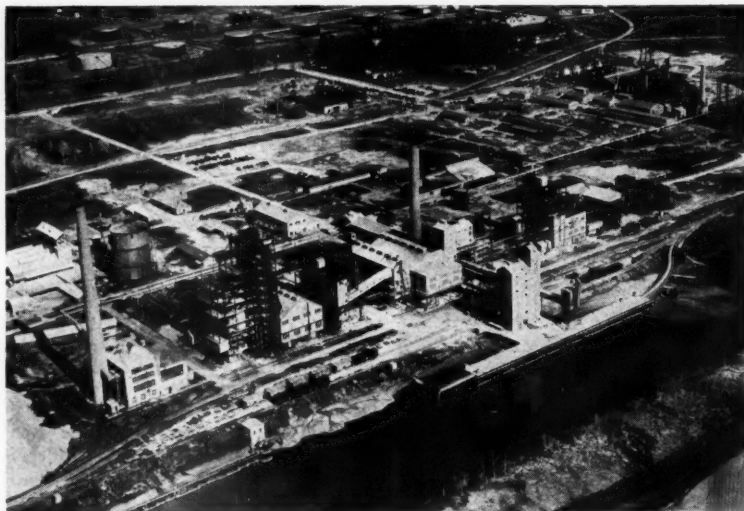
Model Furnace

To test the action of soot removers, the Battelle investigators built a small furnace designed to simulate conditions within an actual furnace, with control of temperature, composition and rate of flue gases. Soot remover to be tested was added to the hot fuel bed, and screens coated with soot were placed in the furnace to determine ignition temperature. Good agreement with Bureau of Mines figures was obtained with this set-up.

All copper compounds were found to be effective, but cupric chloride was the best, lowering ignition temperature of soot 496° F. Dilution with common salt, which is necessary for proper volatilization of the copper (and is cheap), made it less effective by only 82° F. A wide variation, however, existed between the highest and lowest ignition temperatures for many of the compounds tested, and this was most noticeable with copper compounds. This effect was attributed to non-uniform volatilization resulting in inadequate deposition of copper on the soot in some cases.

A synergist (called Synergist A by the company) was found to improve the performance of the copper and make the results more consistent. With a soot remover containing this synergist, common salt and copper compounds, the ignition temperature lowering was 416° F. compared with 353° F. when the synergist was not added. Moreover, the range between the highest and lowest observed ignition temperature was cut from 261° F. to only 29° F. In one comparative test with two proprietary soot removers, Nalco decreased the ignition of the soot 447° F., while the others, which did not contain copper, reduced it only 251° F. and 258° F.—about the same as common salt. On the average, Nalco lowers the ignition temperature of soot to 768° F. where it is burned off at normal furnace temperature.

National Aluminate thinks that its venture into this field has produced the best materials for soot and slag removal, and the response from the industrial field (it only sells to industrial consumers through its own representatives) seems to bear out that opinion. It doesn't think that Nalco is the final answer to slag, however, and is continuing its research.



MATHIESON'S LAKE CHARLES OPERATIONS: The base has been broadened.

MATHIESON'S FINGER IN MORE PIES

Until this year Mathieson Chemical Corporation's business was built almost entirely on salt, limestone and nitrogen. Now it has added sulfuric acid and phosphate fertilizers to its purview.

UNUSUAL activity has characterized the recent history of Mathieson Chemical Corp. The last few months, especially, have seen the consummation of two business acquisitions of far-reaching significance.

Both of these ventures have been motivated by a single purpose: to get more chemicals to sell—more in variety and more in quantity.

Sulfuric and Phosphate

Latest of these ventures is acquisition of two sulfuric acid and phosphate fertilizer producers: Southern Acid & Sulphur Co., Inc., in the Southwest, and Standard Wholesale Phosphate & Acid Works, Inc., in the Southeast. The former company, whose latest fiscal year sales were \$21.8 million and net profit \$2.6 million, was bought for 265,000 shares of Mathieson common stock. The latter, comparable sales and profit figures for which were \$11 million and \$1.4 million, cost Mathieson 225,000 shares.

Out of these acquisitions Mathieson gets not only a new line of heavy chemicals, but also new outlets for its other products.

Caustic and Ammonia

In other moves designed to strengthen its position in alkalis (of which it is the nation's fifth largest producer) and ammonia, Mathieson spent \$29 million in the triennium 1946-1948. The money was spent to purchase the Government-owned

synthetic-ammonia plant at Lake Charles, La.; to double Lake Charles' soda ash and Niagara Falls' sodium chlorite (chlorine dioxide precursor) capacity; and to increase caustic capacity by 40 per cent and carbon dioxide capacity 30 per cent at Saltville, Va.

Last year Mathieson, in order to assure a source of raw materials essential to its plan for expanded operations, bought itself out of a contract, entered into by the previous management, to sell its ammonia to Commercial Solvents Corporation. This contract was to take effect this year and extend to July, 1957. Mathieson is paying a total of \$2.6 million (in annual installments through 1956)—roughly equivalent to \$5.50 a ton or over 7% of the current selling price over the life of the contract—to be released from the contractual obligation.

Solid Growth

Out of the \$29 million spent, the company put up over \$16 million from its own resources, accumulated in 50 years of quiet, conservative growth.

The company was founded in 1892 by a group of American businessmen. The site selected for the new company's plant was Saltville, Virginia, in the extreme southwest corner of the state. Here were available in ample quantity the two chief raw materials for the manufacture of alkalis—common salt and limestone. Coal was available from nearby fields of Vir-

ginia and West Virginia. Here, too, the rayon industry—unknown at that time—was to grow and consume large quantities of alkalis.

To supervise construction of the new plant, arrangements were made to obtain the services of Thomas T. Mathieson, son of Neil Mathieson, of England, who had recently disposed of his alkali business. It was also decided, because the products of the Neil Mathieson Company had long enjoyed a wide acceptance in the American market, to acquire the right to use the Mathieson name.

In 1896 the new firm obtained rights to the Castner electrolytic cell and built an electrolytic caustic and chlorine plant at Niagara Falls, N. Y., where power was relatively cheap. To utilize the by-product hydrogen, the company started making synthetic ammonia in 1923. Sodium chlorite was added to the product roster in 1941. In 1947 the company perfected its own version of the mercury cell, which it is licensing to other alkali producers.

Meanwhile, in 1934, the company had joined the trek to the Southwest, building a soda ash and caustic plant at Lake Charles, La. Mathieson was among the first chemical companies to build in that area.

Calculated Risk

As a supplier of diversified heavy chemicals to industry, Mathieson is in as strong a position marketwise as it is possible to get: No new products are likely to replace sulfuric acid, phosphates, alkalis, synthetic ammonia or chlorine overnight.

Right now Mathieson—along with industry in general—is riding on the crest; profit last year was close to \$5 million compared to the preceding ten-years' average of \$1.5 million.

While sales and profits have been ris-

ing, working capital decreased from something over \$10 million in 1945 (its high point) to half that at the end of 1948 due largely to the use of surplus for plant expansion.

The balance of the expansion money—some \$12 million—was obtained by a purchase money mortgage for \$1.6 million, payable in 1953, and a \$10 million bank loan maturing in 1951-1954 and a current loan of \$1 million.

Just this month, however, the company refinanced its term bank loan through a \$20-million loan from Metropolitan Life Insurance Co. which is to be repaid in 20 annual installments starting in 1952. Half of the money was used to repay the bank loan, \$4 million to discharge obligations of one of the newly-acquired subsidiaries, and \$5 million was added to working capital, restoring it to a strong position.

Do these facts imply overextension? That's the calculated risk in which the apparent disadvantage of loan financing is balanced (and found wanting, thinks the company) against the advantages of diversification and high volume of sales.

Foundation for Future

Under a new management headed up by salesman-businessman Thomas S. Nichols, formerly vice-president of the chemical distributing firm, Prior Chemical Co., the company has crossed the Rubicon, extended its base to a half-dozen major heavy chemicals. Consistent with that extension, it changed its name last year from Mathieson Alkali Works to Mathieson Chemical Corporation.

At the same time, it has intensified its research activities towards the end of developing new products and markets consistent with its raw materials position.

Mathieson's postwar expansion program is practically complete. While the company has assumed a financial burden, at the same time it has acquired the strength, it is convinced, to carry it easily.

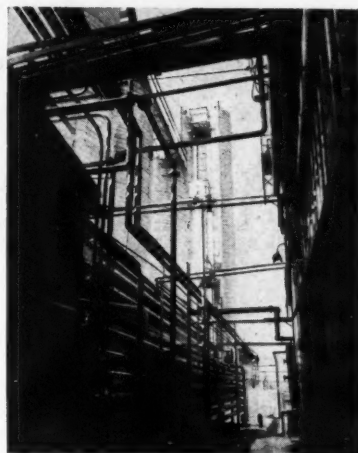
POLAR FILMS

LONG-CHAIN amines, preferably octadecyl, will lay a film on metals to protect them from corrosion by solutions of such acid gases as carbon dioxide when dissolved in a condensate, according to a report by H. Lewis Kahler and J. Kenneth Brown of W. H. and L. D. Betz to the American Chemical Society at San Francisco. Only enough amine is required to provide a protective film for the metal. It does not function as a neutralizer for the acid content of the condensate—the pH of the condensate is unchanged. Increasing protection is given as the chain length of the amine increases and the protection obtained with secondary amines is inferior to that obtained with primary amines.

TRIUMPH FOR TRACY

Bacitracin, rapidly growing in use, joins ranks of large-scale antibiotics.

IT WAS tough luck for seven-year-old Margaret Tracy when she broke her leg, but it was good luck—paradoxically enough—for the rest of the world. For from the *B. subtilis* organisms in the dirt-contaminated tissue of her compound fracture, which miraculously didn't become infected, Frank L. Meleney, Balbina John-



CSC's BACITRACIN UNIT: Margaret's microorganisms multiply.

son and co-workers at the Columbia College of Physicians and Surgeons isolated a new antibiotic.

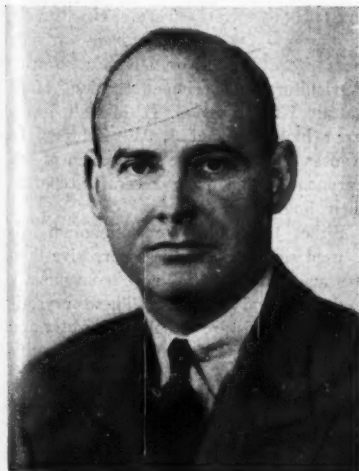
They named the bacterial strain Tracy I in honor of the little patient, and the germ-killing substance itself they named bacitracin, also incorporating her name.

That was back in 1943. Since then the new substance has been isolated and tested clinically, production methods have been devised, and a pilot plant has been operated. Now Commercial Solvents Corp., an old hand at fermentation chemistry, has completed a full-scale plant to produce the new drug (which is probably a polypeptide) by deep-vat fermentation.

Other laboratories, including Merck, Penick, and Sharp & Dohme, are experimenting with the product. A former producer, BenVenue Laboratories, has been taken over by CSC.

Different Spectrum

Why another antibiotic, since penicillin, streptomycin, and several others have proved themselves worthy warriors against disease? Just as a modern army needs all sorts of specialists—each an expert at some facet of killing—so does the modern medical man need a whole battery of germ-killers to dispel the crafty foes. Each antibiotic attacks some or-



T. S. NICHOLS: The Rubicon crossed.



JOHNSON AND MELENEY: Now it's being injected.

ganisms not touched by the others (or some formerly controlled but which have developed resistance to other antibacterial agents). Each one, in other words, has a different spectrum of activity.

Bacitracin is generally effective against the same organisms controlled by penicillin; but it destroys many strains unaffected by the latter substance. It is particularly effective in the treatment of boils, carbuncles, eye infections and other local pus-forming lesions. Because of this property, it frequently makes surgical incision of abscesses, ulcers, etc., unnecessary.

One especially encouraging field is opening up in the treatment of amebic diseases, such as amebic dysentery, which have not yielded heretofore to antibiotics. Symptoms promptly disappear in almost every case, and in a great majority the organism is completely and permanently routed. Its usefulness here depends partly on the fact that bacitracin given orally is not absorbed from the alimentary tract. Thus it is effective against a wide range of intestinal invaders.

To most people—94 per cent—one outstanding advantage of bacitracin isn't of great moment; but to the 6 per cent who become sensitized to penicillin (and the 5 per cent to "sulfa") the new antibiotic is a great boon, for its use over long periods of time seldom causes allergic reactions.

Looking Forward

The first bacitracin, like the first penicillin, was yellow. Purification techniques

have improved to the point where the product has only a slight tan cast and is stable without refrigeration for at least a year and a half.

The commercial product is intended to be used only externally—not intravenously nor intramuscularly. But Meloney has successfully injected certain lots of the material into the muscles of over 200 patients. (Systemic injection of the present commercial product causes kidney irritation and occasional nausea and vomiting.) These particular lots were not specially purified; it appears that some batches fail to produce the toxic impurity responsible for the ill effects. Efforts are being made to track down and eliminate the toxic agents.

CSC now distributes bacitracin as the dry powder and in ointments. Troches and nasal drops are next on the agenda, and further clinical experience will dictate the course of future progress.

DEATH TO CO

• DEATH-DEALING carbon monoxide, serious hazard in insufficiently ventilated locations where combustion is taking place, can be effectively destroyed by silver permanganate, reported chemists of Canada's Defense Research Board to the recent American Chemical Society meeting in San Francisco. Advantage of the new material over commonly-used hopcalite is that it remains potent under humid conditions. It is also more active when carbon monoxide concentration is extremely low.

GRASS ROOTS WRECKER

Trichloroacetates promise control of noxious perennial grasses, supplement 2,4-D as weed killer.

FARMERS who have seen 2,4-D perform miracles as a weed killer have wondered whether any chemical would do the same for hard-to-kill grasses. This season they'll be able to find out for themselves since limited supplies of a new chemical weed killer are available from E. I. du Pont de Nemours & Co., and The Dow Chemical Co.

TCA, as the new product is called (group name for trichloroacetic acid and its derivatives), promises to supply the "two" of a one-two punch delivered in conjunction with 2,4-D. The latter is effective against broadleaf weeds, while tests on the former show results never before attainable with any other chemical: good grass control without soil sterilization for a comparatively long period. (Chlorates and arsenicals kill grasses, but they render crop land useless for too long a time.)

As is the case with most new chemicals available in small quantities, cost is relatively high. However it is expected to be considerably cheaper in a short time.

Herbicidal Research

The unique properties of TCA were discovered when, as part of the herbicidal research program at the Du Pont Pest Control Research Laboratories, ammonium trichloroacetate was tested as a general contact herbicide. It was found to be useless for this purpose, but it did completely kill all grass plants against which it was tested. The further preliminary tests warranted by this discovery showed that ATA was very promising for grass control, and experimental quantities of both ATA and STA (sodium trichloroacetate) were released to investigators. A large number of field tests were carried out at the Kansas Agricultural Experiment Station, Manhattan, Kansas, by G. L. McCall, a Du Pont biologist, and J. W. Zahnley, of Kansas State College's department of agronomy, who have recently reported their findings.

Either the sodium or ammonium salt is used since they are less corrosive than the acid and can be more conveniently packaged and handled. These crystalline compounds are dissolved in water and applied as a spray in sufficient quantity to give adequate coverage and in concentrations that vary with the species to be treated and the conditions of growth. The Kansas workers found that 80 to 100 pounds of TCA per acre would control most noxious perennial grasses, and

this was the rate of application recommended at the recent North Central Weed Control Conference for such grasses as quack, Bermuda, Kentucky blue, and Muhlenbergia. Johnson grass is more resistant, and higher rates are needed for its control. Prickly pear cactus, which grows as isolated plants, can be effectively eliminated by wetting with a solution containing $\frac{1}{2}$ pound of TCA per gallon of water.

Application Conditions

Results obtained with TCA have varied somewhat depending upon the conditions under which the material was applied. The root system of the grass being treated is an important factor in the chemical's effectiveness. With deep-rooted grasses such as Johnson grass, spraying of the foliage gives better results than soil applications. The TCA is translocated downward to the roots, whereas with soil applications it probably cannot build up a lethal concentration at the relatively great depth of the roots. Grasses such as quackgrass that have shallow root

treatments just before or during bloom seem to be best, but for other grasses good control was obtained over periods extending from June through October, and by other workers in other localities, from April through November.

Future Role

A bright future in weed control is envisioned for TCA. Localized treatment with it can eliminate noxious grasses from valuable crop lands and permit planting within a relatively short time. The period of soil sterility will vary with the amount applied and the soil, but in general this is from 30 to 90 days, depending on the amount of rainfall.

Relatively light applications (10 to 15 pounds per acre) provide an effective means of controlling annual grasses. This retardant effect is very valuable for places such as roadsides, irrigation-ditch banks, vacant lots, and industrial grounds where grass coverage without accumulation of organic debris is desired.

TCA will also have use as a herbicide for special plants that 2,4-D or 2,4-T

ACS BRIEFS

Several papers of industrial interest were presented at the American Chemical Society's recent national meeting.

● **INDUSTRY IS ENTITLED** to reasonable use of the diluting capacity of streams for waste disposal to the end that overall costs may be balanced against overall benefits, claimed William J. O'Connell, of W. J. O'Connell & Associates. The handling of the purely chemical factors in industrial wastes may call for confiscatory expenditures for waste treatment plant works.

● **WORLD PRODUCTION** of tin is expected to reach 170,000 tons this year, said Walton S. Smith, Metal & Thermit Corp., and 190,000 tons in 1950. Demand, however, is 190,000 tons a year, so the world shortage will remain critical for at least another year.

● **THE THEORY** that fire-retardant paints would, by hindering combustion, increase the evolution of carbon monoxide and other toxic substances during fire, has been disproved, said Mark W. Westgate, of the National Paint, Varnish and Lacquer Association. Actually, the reverse was found to be true: Less CO was formed from wooden panels coated with fire-retardant paints than from those painted with other types of finishes.

● **A PIECE OF LABORATORY EQUIPMENT** described by Clyde A. Dubbs, Veterans Administration Center's Los Angeles Medical Research Laboratory, minimizes hazards of radioactive contamination. The apparatus consists of two tubes joined at an angle by a piece containing a stopcock. By inserting a filter disc in one of the tubes and piercing the filter with a thin hollow tube, a chemist can filter, distill, condense, centrifuge, and dry a material without transferring or taking the apparatus apart.

● **THE USE OF ION EXCHANGE** in a large pilot plant producing dextrose from corn starch gives yields of over 90 per cent in contrast to yields of approximately 82 per cent obtained in existing commercial plants, said R. H. Rogge, Corn Products Refining Co.

● **REDUCTION OF CARBON DIOXIDE** with lithium borohydride, reported W. G. Brown and J. G. Burr, Jr., of Oak Ridge and diborane. Yields range from 71-88 National Laboratory, gives formic acid per cent.



ZAHNLEY AND McCALL: A one-two for agriculture.

systems are best controlled by soil application, since lethal concentrations are easily built up to a shallow depth.

Soil conditions play a major role in the results obtained with TCA. Moisture is necessary to carry the chemical into the soil, but if it is excessive TCA may be leached out to a point where it is below lethal concentrations in the root zone. Soil texture has much influence, better results being obtained in light than in heavy soils.

Although there is some variation in results with the stage of development of plants, soil moisture seems to be a more important factor. For Johnson grass,

does not kill. Prime target in this category is the prickly pear cactus which it may eradicate from the pastures and ranges of the southwest.

The new chemical's compatibility with 2,4-D and 2,4,5-T formulations suggests use of mixtures for areas infested with both perennial grasses and broadleaved weeds. Both types of vegetation can be killed in one step, or varying degrees of control can be achieved. In ditch banks, for example, a light dose of TCA combined with a lethal 2,4-D dose will control the grass while killing the non-grasses. Weeds and grasses can be K.O'd or just staggered.

A Case Study of How STATISTICAL CONTROL Expedites Chemical Operations

by G. N. CORNELL
A. E. Staley Mfg. Co.,
Decatur, Illinois

MATHEMATICAL INTERPRETATION OF DATA by standard statistical methods is a powerful tool for quality improvement and cost reduction. Applied extensively during the war in the mechanical fields, it is now being found useful in the chemical process industries, as described in this case study of its use by A. E. Staley Manufacturing Co.

WITHIN the last 20 years the rapid development of statistical methods of quality control has provided industry with a new and powerful tool whose wide use promises to improve the quality of manufactured products and to reduce the costs of their production.

The statisticians have developed the basic mathematical theories behind these methods and have worked out the actual adaptations of the methods themselves. The basic concepts are equally applicable to both the mechanical industries and the chemical and process industries.

During the war certain of the techniques of statistical quality control were applied extensively to the mechanical industries and achieved a great deal of publicity and popularity, so that a broad program was established by the government to disseminate this information. Many of the applications that were made in the war industries resulted in rather spectacular savings in men and materials and in some cases they were even credited with the salvaging of programs that had seemed impossible of achievement.

It was inevitable, therefore, that those in the chemical and process industries should look to these tools for aid in solving the basic problem of the control of chemical reactions and physical processes. It was quickly evident that those techniques so successful in the manufacturing of piece-parts could not be bodily applied to chemical problems without some modifications, and that certain other techniques which had not been spotlighted previously would be found to have great value.

CHANGES NECESSARY

Just why this is so becomes apparent when one considers that the chemical industry deals generally with large, more or less homogeneous masses of material, either in batches or as continuous flows, in which latter case the variability from

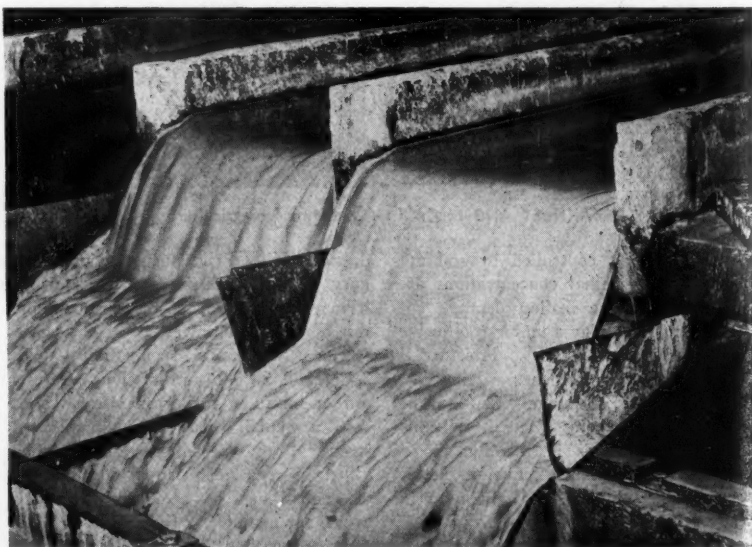
instant to instant occurs in relatively small increments because of the presence of surge points. The retention time in process of these masses of material is often long and it frequently occurs that the time required for analysis is relatively so great that much off-grade product can be produced before corrective action becomes effective.

At the same time, the measurement of quality characteristics, both of finished product and of in-process material, involves variability in sampling and in analysis as well as the variability inherent in the process itself. These measurements are generally chemical or physical tests which are time-consuming and costly. This situation is contrasted then with that in the mechanical industries where generally only the inherent variability of the manu-

facturing process is of concern, and where the measurement is a simple gaging operation.

In applying statistical methods to control in the chemical and processing industries it has therefore been necessary for us to go back to the basic concepts and understand them a little. From that starting point it appears that here exists a fertile field for quality control. At Staley we have found a number of opportunities to employ statistical techniques, and since we have really only scratched the surface, it is our hope that as we deepen our understanding of this science more and more benefits will accrue to the industry.

The chemical industry has always thought in terms of control; the name commonly applied to its inspection department is "control" laboratory. Because of the inherent nature of its processes it is already a fact that the major emphasis of control is on making the product right at the start rather than on screening out defective product. There is little doubt then that the new tools will find ready acceptance.



High flow rates on starch separation tables point up need of statistical control to prevent accumulation of off-grade material while relatively slow mechanical and physical tests are being run.

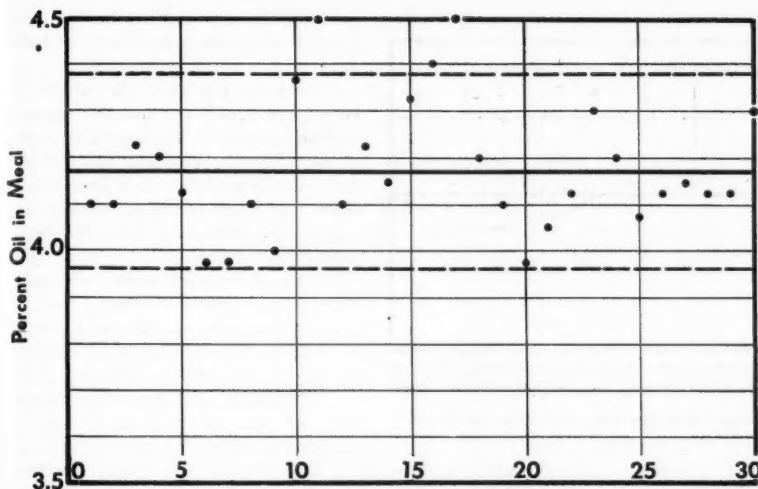


Fig. 1—Control chart (April, 1947) showing process out of control on the 11th and 17th. The average value and control limits are carried forward from previous data.

STALEY OPERATIONS

In its Decatur, Illinois plant, the Staley Company processes in the neighborhood of 50,000 bushels per day of corn by the wet milling process, separating it into starch (68%), corn oil (3.5%) and gluten feed (28.5%). The process is, in the main, a physical one involving softening the shelled corn in a dilute sulfurous acid solution, grinding, separation of the oil-bearing germ by flotation, separation of fiber by screening, and separation of protein-bearing gluten by settling out the starch. The starch is refined and dried as such or converted into glucose or modified starches. The oil is expressed from the germ, while the other components are dewatered and combined into corn gluten feed.

This particular plant is the third largest in the world. Corn enters it at a rate of 2,000 lbs. per minute, while the process streams are slurries flowing at rates ranging from 8,000 to 20,000 or more lbs. per minute.

The company also processes in the neighborhood of 50,000 bushels per day of soybeans, employing both mechanical expression and solvent extraction to separate them into oil (18-20%) and soybean oil meal (80-82%). Here again the magnitude of the flow streams is tremendous.

We have tried to exercise control with a group of quick measurements that have grown up out of years of operating experience. Typical of them are temperatures, pH's, slurry concentrations and simple chemical tests, and their adoption was often the result of someone's idea that a particular variable was critical with respect to specific quality characteristics and should be controlled. That this has not been an entirely effective solution of the problem is shown by the rather wide range of variability that was found in most of our products upon their examination by the control-chart method of analysis.

The mechanics of these control procedures is quite simple. Samples are taken of both in-process material and finished goods along three routes at approximately hourly intervals, composited on a lot-wise, shift-wise or daily basis, analyzed, and reported on laboratory results forms issued daily. These reports contain in the neighborhood of 300 results for control of the processes and somewhat more than that for control of finished products quality. It is one function of the chemical engineering department to analyze these various results, pointing out deviations from established standards and recommending changes in processing procedures to bring the results back into line.

SETTING CONTROL LIMITS

It was to this results analysis that we made our first application of a statistical quality control technique. Because of the large number of results to be studied and the fact that little was known about

normal fluctuations, this work in the past was largely a hit-or-miss proposition.

Since 1945, however, the use of quality control charts has placed results analysis or process control on a more rational basis and accomplished (1) a saving in time, through spotlighting deviations; (2) a saving in energy expended by avoiding the investigation of deviations within a normal range; and (3) a method of visualizing trends not readily apparent from daily examination of a large number of tabulated figures.

The first step was to select some 25 key results both of in-process control points and of finished product quality characteristics. As each day's laboratory results become available, they are plotted on a control chart which will eventually contain one month's results.

As soon as a suitable history of normal operation has been achieved, the daily averages are used to compute the overall average and the standard deviation from it. Limits are determined from the latter by statistical consideration such that 99.7 per cent of all values will fall within them. It should be emphasized that control limits thus arrived at are not arbitrary; they are determined by the process' inherent characteristics.

A typical chart is shown in Figure 1, where the oil content of expeller soybean oil meal is shown for April, 1947. The central value of 4.2 is that extended from earlier operation, as are the control limits. Points were shown out of control on the 11th and 17th. Upon investigation it was found that short shutdowns occurred on those days and on the 23rd and 30th as a result of a certain type of power shortage. This disruption of operation explained the bad results, as it is a property of these expellers to require several hours to attain equilibrium and good performance after being started. Pointing this out to management resulted

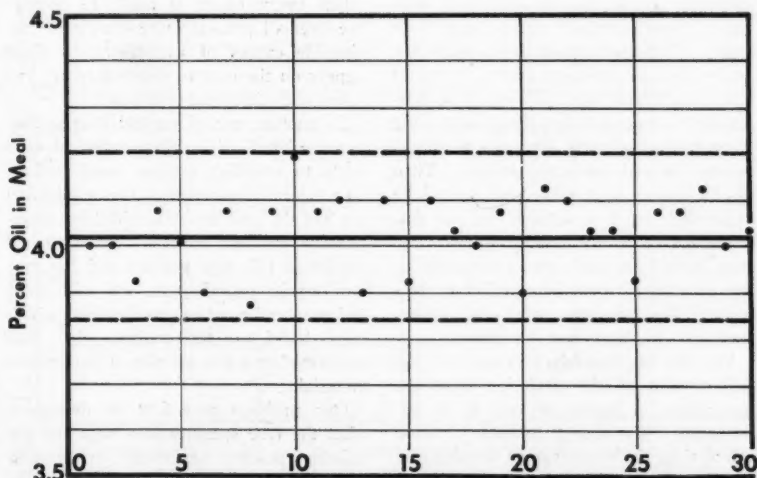


Fig. 2—Same chart for June, showing lower average value and tighter limits as a result of analysis and correction of factors giving out-of-control values in April.

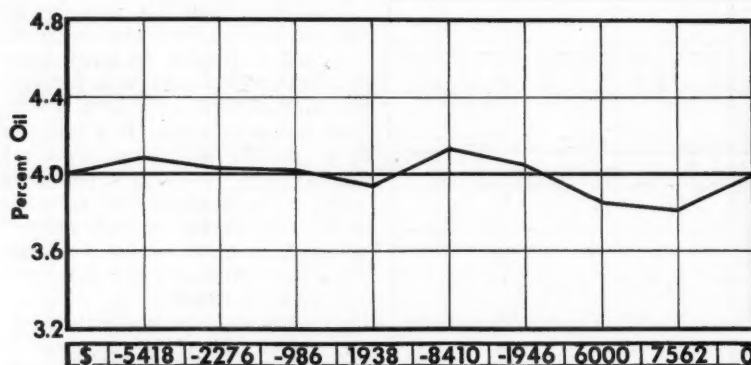


Fig. 3—Meeting or failing to meet "par" is given a dollars-and-cents value for monthly presentation to operating personnel.

in changes which made these short down-periods unnecessary.

By June the condition had been corrected and the chart for that month is shown in Figure 2. Here most points are below the earlier central value and a few are below the earlier lower limit. It is evident that a recalculation of these values was necessary for the chart and a result was the lowering of the central value to approximately 4.0 and a tightening of the control limits. We shall see later what such a change means in dollars and cents.

With these charts constantly available, it is easy to follow results, and points falling outside control limits call for immediate investigation. We don't always find the cause, as often it corrects itself before any action is decided upon. However superintendents and foremen have been acquainted with the charts and their general theory, and we have found them very helpful in trouble-shooting.

MONTHLY REVIEW

Each month a verbal review summarizing the results of the previous month is made to a meeting of management and operating superintendents. In general, the results discussed are those on which monetary values can be placed on deviations from standard central values or "pars". The pars have been established on the basis of statistical study for periods when operations were known to be substantially normal, when the results were in statistical control, and when related results showed consistent values. Then on the theory that these pars should be reasonably hard to achieve but not impossible, we adopted the standard that they should be such that one-fourth of the time they would be equalled or bettered. The par was calculated mathematically to meet that condition.

We plot the monthly averages and the dollar value of the deviation from the par value, in green or red as is appropriate. The theory in back of these calculations becomes rather involved in many cases. An idea of the principle can be gained, however, by considering one of the simpler cases, such as the residual

oil in expeller soybean meal, where the par established is 4.0%. If we produce 30,000,000 pounds of commercial meal in a given month, and this meal contains 4.2% oil, then we sold so much oil as meal. By a fairly simple calculation, we see that $30,000,000 \times 95.8 = 28,740,000$ lbs. of non-oil material. At 4.0% oil we should have had $28,740,000 \div 0.96 = 29,940,000$ pounds of meal and 60,000 pounds of additional oil. At today's differential in value between oil and meal of the order of 20 cents per pound, this amounts to a dollar deviation worse than par of the order \$12,000. As the chart (Figure 3) shows, we haven't been doing that poorly during 1948.

PRODUCT "SPECS"

We have made considerable use of control charts in investigative work. Their simplest use, of course, is in matching control charts for in-process results with those for product quality and examining for the coincidence of out-of-control points. This sometimes reveals at a glance the why of some trouble and indicates the corrective action.

Next is the quite conventional plotting of control charts on specially-taken data when every effort is made to observe the over-all process quite closely for assignable causes of variation. As these appear on the control chart, they are run down and eliminated post-haste.

In another use of control charts, they are combined with other statistical concepts to establish product specifications. In a typical illustration of this application we had the problem of establishing specifications for soya lecithin. Research had developed this new product and the process for its manufacture, and with sales had prepared a set of specifications which were based on the analyses they had performed on a few samples of competitive material.

Our problem was first to determine what the true specifications were for the existing process performed in existing facilities; secondly, to sell these values to research on a temporary basis; and finally to modify the process to bring the

product within the desired range of specifications.

Among the quality characteristics involved in the study were moisture content, acetone insoluble (a measure of the purity of the product), free fatty acid content, color, and peroxide value. To illustrate what was done, moisture content and acetone insoluble have been chosen as typical examples.

The procedure involved for each quality characteristic was as follows:

1. The data are plotted on a control chart. If this shows that statistical variation exists, it is then possible to calculate what degree of variation may be expected from this quality characteristic in the future. If lack of control is shown, however, such predictions are not valid and we cannot continue the procedure until we find and eliminate the causes of lack of control.
2. Agreement must be reached on the amount of material which will be tolerated outside specification limits. This has to be reached from a balance between the cost of rework or of penalties, etc., against the cost of maintaining tighter limits.
3. Integration of the normal distribution curve, together with the information already developed, gives the range of values within which will be found the desired percentage of production. These values are the temporary specifications with which we must be satisfied until we can proceed with process modification.

COUNSELING RESEARCH

The application of this procedure to moisture content and acetone insoluble is shown in Figure 4. In the case of moisture content the control chart shows that the process is in control. Since we had only eight points in this chart we calculated the standard deviation directly from the data and found a value of 0.28. It was agreed that we could tolerate 5% of our production above the upper limit of moisture, so, from the integral, this limit must be—by calculation—the average value plus 1.645 times the standard deviation, or $0.80 + (1.645 \times 0.28) = 1.26$. In this case the original research specification had been a maximum moisture content of 1%, so we had to ask research to accept a 1.26% maximum and we actually arrived at a 1.3% value. However, we were also able to show, again using the integral, that they would expect to have only about 12% of the production above the desired 1.0% upper limit, and it was this fact that probably helped us most in selling this relaxed specification.

In the lower half of Figure 4, is shown the treatment employed in the case of acetone insoluble. Crude lecithin is a mixture of oil with the lecithin and the

latter is insoluble in acetone. By A.I., then, is meant simply the percentage of lecithin in the mixture.

The control chart plot indicated that the process was in control with respect to this quality characteristic as well. By statistical analysis of the data it was found that the customary control limits for the process were 64.4% and 68.5%. These actually turned out to be within the 64.0% to 68.5% limits which had been originally established by research.

The foregoing discussion does little more than indicate what can be accomplished with the use of control charts in investigative work. If there is a general pattern it is something like this: a situation arises where capacity is low, product quality results are poor, processing efficiencies are substandard, or specifications are in question. Data which appear pertinent are plotted on control charts, evidences of lack of control are investigated, and corrective measures are instituted until a picture of statistical control results. Sometimes this alone solves the problem. At other times we may find results still unsatisfactory and must proceed with process changes designed to shift the central value or vary the control limits of the quality characteristics in question. Use of the statistical constants of a process which is in control then serves as a yardstick for evaluation of course, quite involved, but its knowl-

CORRELATION OF VARIABLES

We have so far confined our discussion to the use in the chemical industry of the particular group of statistical methods which have proven of value in dealing with problems of quality control in general manufacturing.

However, the literature of statistical methods, based largely on the theories of probability, goes at length into the fields of biological research, public opinion polls, market research, business forecasting and many others. We should hope to apply many of these techniques in the processing industries where research and development work constantly goes on. This brings us back to the idea expressed earlier that we must get a broader understanding of the fundamentals of statistical methods in general in order that we can avail ourselves of the full benefit of this new tool.

The group of correlation techniques whose purpose is to establish relationships between one or more variables and some measure of quality of either product or process efficiency is one of the important ones which has been found to have value in the chemical industry.

Reference has already been made to the simplest type of correlation wherein control charts on data where relationship is suspected are watched for the coincidence of out-of-control points or of trends. This is not a very powerful technique

and it has the disadvantage of requiring a rather large amount of data. Its usefulness is fairly well confined to general process control where daily charts are maintained on routine analytical results.

A relatively simple yet quite effective correlation technique is the chi-square test, which is designed to test the significance of a scatter diagram. The mathematics is, of course, quite involved, but its knowledge is not essential to the use of the test. We have had some success with its use as a tool in investigative work.

The particular study which we propose to employ as an illustration was an investigation performed in our table house. This is a six-story building, each floor containing 72 starch tables on 2' x 110' troughs about 8" deep. After separation of germ and fibrous components from the slurry of ground corn, the residue is a mixture of starch and the protein-bearing gluten. As the slurry flows over the tables, the starch settles in relatively pure form while the gluten tails on over the end. For a long period prior to the start of this investigation the flow rate recommended for this operation was 5 gallons per minute per table.

As is so common with separations of this type, the starch obtained is not absolutely pure, but always contains a small residual content of the proteinaceous material. From experience we have learned that the tolerable maximum protein content in the starch is in the neighborhood of 0.45% and we have never had particular difficulty in maintaining the operation within that limit. However, some trouble was experienced in 1946, and in 1947 the operation went clean hay-wire.

Appraisal of the problem indicated

possible causes of two general types: (1) the operation itself had deteriorated in some manner; or (2) the nature of the raw material corn had changed in some way.

Investigation of the former would obviously be a rather long, tedious job. We felt that investigation of the latter with the chi-square test might give us the answer. We therefore selected all the variables on which data were available that might possibly be factors affecting the separation and tested them for the contingency that they might be related.

PROBABILITY OF CORRELATION

Figure 5 shows the results of this testing for four of the variables that were examined. In the upper portion of this figure is shown how the test for correlation of free fatty acid in corn oil with protein in starch was performed. The value of chi-square obtained was 45.6 and from the chi-square table a value of P is obtained of <0.001. This means that the probability of an arrangement of data in this pattern occurring by chance is less than 1 in 1,000, and that we have adequate evidence for concluding that there is excellent correlation between F.F.A. and protein.

In the case of measured damage in the corn the P obtained was 0.004, and this value again indicates correlation. This was expected because we already know that damage was a factor in causing high F.F.A. in corn oil. On the other hand, the ratio of starch to gluten and the amount of run-around, factors which might have been involved and which had shown variation, gave P's of 0.359 and 0.471, and the conclusion was that the data did not indicate correlation.

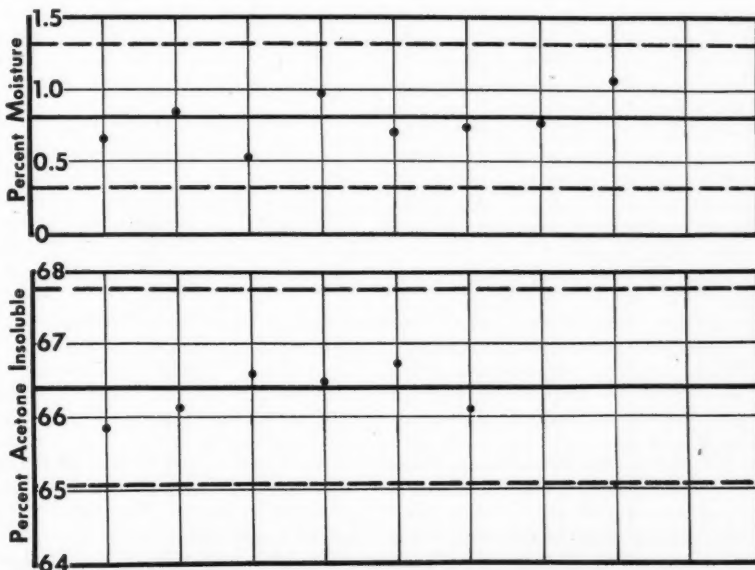


Fig. 4—Control charts can be used to establish product specifications. Analysis of moisture content data showed that the upper control limit had to be 1.26% (compared with research's specification of 1.0%) in order to be realistic. Statistical analysis of the data for acetone insoluble proved that the limits set by the research department could be adopted.

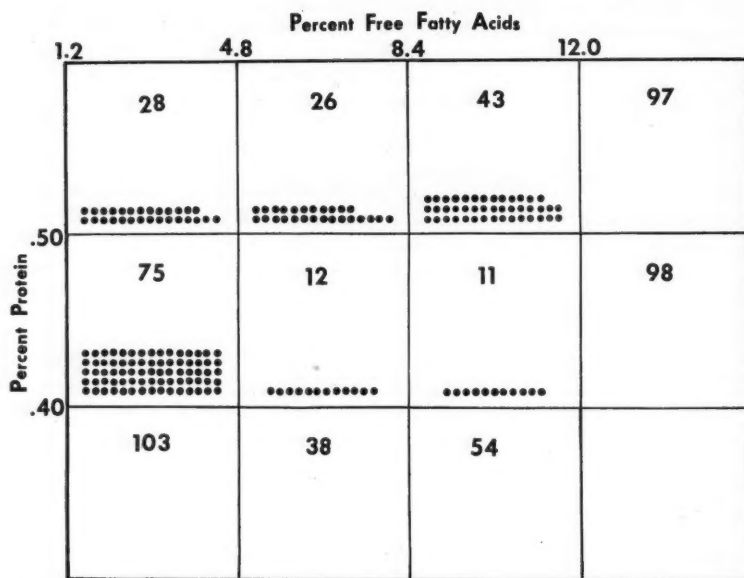


Fig. 5—The chi-square test proves whether one variable is dependent on another. Probability calculated from above data that the amount of free fatty acids in corn oil is related to the amount of protein in the starch is better than 999 in 1,000.

From this study, we concluded that the operation had not been substantially changed, and that the increase in protein had been caused by a change in the character of the raw material corn. To reduce protein we had to achieve a basic change in the operation, inasmuch as we couldn't do anything about the corn.

We, therefore, went to work on the process, and found that, whereas an overall flow rate of 5 gpm throughout the house might have been OK for some kinds of corn, for this particular kind of corn flow rate was more critical. We then found that the length of time it took the slurry to flow the length of the table was really the important control, and that due to a wide variation in table pitches, each table must have its flow rate specified individually. These rates were found to range from about 4 to about 7 gpm, and the new schedule was placed in effect. After the new schedule the improvement was obvious, as the central value went down from 0.53 to 0.44, while the control limits were narrowed, indicating that more uniform operation was an added benefit.

A second statistical technique which can be used to determine relationship among variables is that commonly referred to simply as correlation. The treatment in general is to determine whether or not the data fit a straight line and involves calculation of the correlation coefficient, r . When perfect correlation exists, the value of r is 1.0 (if one variable increases with the other) or -1.0 (if the relationship is inverse). If no relationship exists, the value of r is 0.

So far we have only shown the existence of correlation, and to get any good out of the relationship, e.g., to be able to

predict what corn syrup colors will result from given values of protein in starch, it is necessary to fit these data to a curve. This is done by assuming a straight line, known as the regression line. This solution is again relatively simple, although involving a lot of arithmetic.

A final step in this procedure is to determine the variance or standard deviation of values of the dependent variable about the regression line. The result then, is the ability to predict the range of, say, what corn syrup colors will result from a given protein value in starch, and this is what we really want.

At the same time, it should be pointed out that the relationship does not necessarily fit a straight line but may be curvilinear.

MULTIPLE CORRELATION

Another statistical technique is that of multiple correlation. This is applicable to the case where two or more variables are related to a quality characteristic. This technique serves to provide knowledge of the effect of each factor on product quality.

How this is useful can be illustrated by an example in which, say, three variables are found to affect quality. A is the major one, B has nominal effect and C has little effect. Suppose now that C were expensive to control, while B could not be controlled, and A could be placed under excellent control with little expense. It is easy to decide what steps to take in such a case.

The other application of multiple correlation is to investigative work. Here its value is to provide knowledge of the effect of several variables in an experiment where it is not possible or practical

to hold all variables but one constant. An example of this might be in the testing of a corn germ expeller. Factors known to have more or less effect on oil recovery are temperature, moisture and oil content of the germs, barrel temperature, barrel bar spacing, and choke jaw setting. By the use of multiple correlation we might narrow these down to two important ones, say germ moisture and choke jaw setting. It is relatively simple to hold one or the other of these variables constant and we may determine rather precisely the effect of each.

ANALYSIS AND ANALYSTS

Since chemical tests are used for plant and product control it is essential that methods be as accurate as possible. Statistical methods can be used for checking the accuracy of analytical methods. This involves three steps: (1) the establishment of accuracy of the method; (2) the establishment of normal operator error; and (3) routine checkup on daily operations.

The first step (which need not be first chronologically) is to determine the reproducibility of the method in the hands of an experienced analyst. A series of check determinations is made on the same sample and the standard deviation of 10 or more determinations from the average is calculated in the usual manner (Figure 4, Table I). For protein in corn gluten feed this standard deviation was found to be 0.33.

The second step involves checking one analyst against another. The method described by Simon (*Engineers' Manual of Statistical Methods*, p. 155) is used for analysis of the data. A series of different samples are given to two regular analysts and the difference between their two results, D^1 , is tabulated. Having determined the standard deviation of the differences it is necessary to divide by $\sqrt{2}$ to obtain the standard deviation for the method, since the true analysis is not known. The regular analysts, it was concluded, are almost as accurate as the method allows, since their results showed a standard deviation of 0.44 compared to 0.33.

The third step, which we consider most valuable, is to set up a routine checking method to show the analysts the kind of results they are obtaining. Each day for each kind of analysis one sample is checked and the difference plotted on a control chart posted in the laboratory.

This particular program has been applied to our key analytical results for over three years, and we feel it is paying dividends by providing incentive to management to improve methods and to the analysts to improve technique. It provides a competitive spirit among the analysts, finally, it gives us rather precise knowledge of the dependability of the many analytical procedures.

PHTHALIC ANHYDRIDE

Twenty-fold in Twenty Years

by HERMAN W. ZABEL
Associate Editor,
Chemical Industries

PRODUCTION AND CONSUMPTION of phthalic anhydride have come into balance during the past year. Demand for vinyl plasticizers and alkyd resins, the largest consumers, is easing, but the long term picture is bright.

NEW production facilities, more efficient naphthalene recovery from coal tar, and a decrease in demand have changed the phthalic anhydride buyer's question from "How much can you give me?" to the more normal "What's your price?" This change has also signalled users that inventories can be cut to a bare operating minimum. One consumer reports that he has been able to operate out of inventory for the past three months. "However," he adds, "the warehouse is getting empty." Stocks in the past had been kept large "... just in case ..."

Easing of demand has been noted in the two largest consuming industries—alkyd resins and phthalate esters. Their combined consumption is about 80 per

cent of total production, requirements for esters being only 30 per cent of this total. Next in line as phthalic consumers are makers of dyestuff intermediates such as anthraquinone for vat dyestuffs and phthalimide for phthalocyanines.

ALKYDS

The great proportion of alkyds are glyceryl polyesters of phthalic acid modified with various other polyfunctional alcohols and organic acids to provide a desired combination of properties. Monobasic acids are used to control the degree of condensation, while acids with conjugated double bonds such as linoleic give drying, properties to the resin.

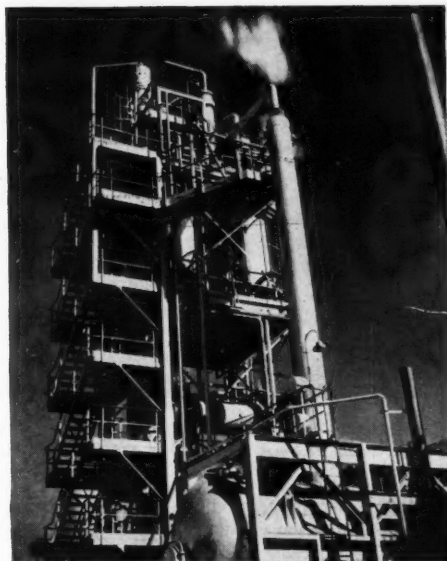
Phthalic anhydride owes most of its

twenty-fold production increase since 1929 to alkyd-resin finishes, introduced on a large scale in that year. These finishes, the principal consumers of alkyds, are slow in drying but combine high gloss with excellent durability and adhesion. They are readily admixed with most paint and lacquer ingredients and are compatible with phenolic and urea resins.

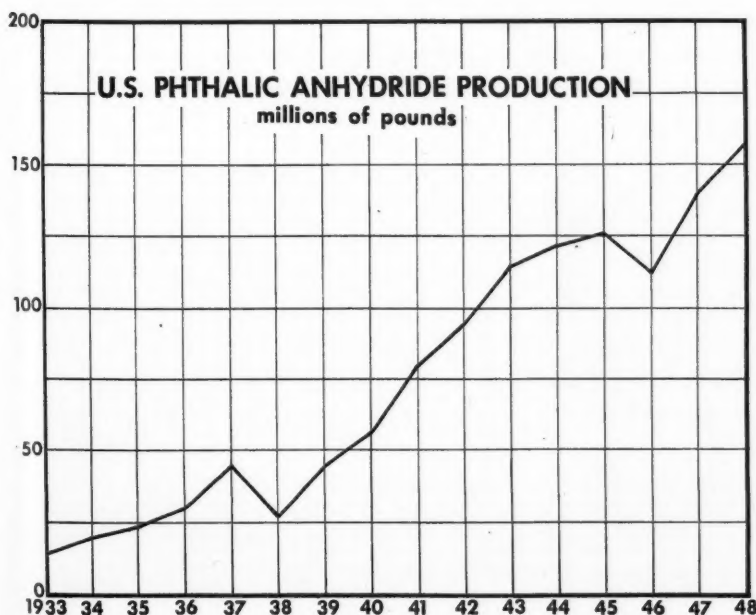
Use of low-molecular-weight esters of glycerine and phthalic anhydride as plasticizers is a more recent application of alkyds. To a certain extent the properties of the plasticizer can be regulated by the degree of condensation permitted and the choice of alcohols and acids used in production of the alkyd. These polymeric plasticizers are less efficient than the monomeric materials but they are permanent, do not migrate, and are less susceptible to leaching by solvents. Rohm and Haas Co. was the first organization to introduce a plasticizer of this type, followed by Emery Industries, Inc., General Electric Co., and Carbide and Carbon Chemicals Corp.

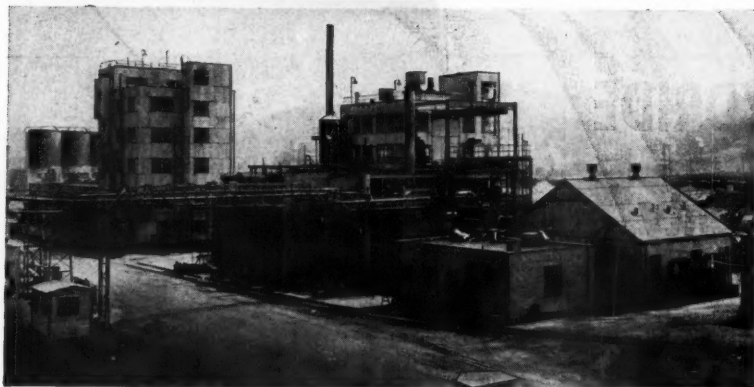
Somewhat similar results are achieved by use of Benthall (*CI, April 1948, p. 561*), manufactured by Monsanto Chemical Co. Benthall is a mixture of 95% benzoic acid and 5% phthalic anhydride prepared by the decarboxylation of phthalic anhydride. Use of benzoic acid or other monocarboxylic acids to modify and control alkyd properties has been known for some time but its large-scale application in the manufacture of finishes has been too costly. Monsanto's mixture, which costs only about 60% as much as pure benzoic acid, promises to expand this field.

Demand for phthalic anhydride for alkyd resins has slumped decidedly in the past few months. Some assert that this is merely the reappearance of the prewar



Phthalic purification at Oronite's plant.





Construction of this new phthalic anhydride unit of Pittsburgh Coke and Chemical Co. at Neville Island, Pa., was completed in the fall of 1948.

seasonal demand pattern. Others feel that the reduction is too great to represent a mere seasonal decline. Proper evaluation of certain abnormal and temporary conditions gives an answer somewhere between these two viewpoints.

Many alkyd producers have been awaiting the announcement of the government's flax price-support program before deciding on next season's requirements. This program will to a great extent set the price of linseed oil and have a profound effect on paint prices. The backlash will hit alkyd and eventually phthalic anhydride demand. A further abnormality, already mentioned, is the attempt of phthalic users to reduce inventories to a bare minimum consistent with continuous plant operation. This is a great swing from the practice of the past few years when all users, fearing a reduction in the next month's allotment, have taken all the phthalic they could get.

A trade source puts it succinctly: "Phthalic users are again forcing phthalic producers to carry as much of their working capital load as possible." In turn phthalic producers are cutting their load by storing phthalic in the form of naphthalene. The ball is then passed to the tar distiller who must store naphthalene until demand for his other co-products falls off. It is not believed that total naphthalene demands have been greatly reduced, and there has been little if any reduction in naphthalene prices. As yet, there has been no softening in phthalic prices, and over the next few months the normal seasonal recovery in alkyds should provide some hardening of demand. A further indication of the confidence of alkyd producers in this demand is provided by Reichhold Chemicals, Inc., which is constructing a new alkyd plant at Houston, Texas. The first unit is scheduled to begin production in the early summer with other units to come in over the next eighteen months.

Paradoxically, expansions in phthalic capacity have given rise to the belief that demand, for alkyds in particular, is down.

Two of last year's expansions—that of the Koppers-Pittsburgh Co. at Kobuta, Pa., and Reichhold Chemicals, Inc., at Detroit, Mich.—are captive units of alkyd producers (Pittsburgh Plate Glass Co. and Reichhold, respectively). The 14 million pounds per year of phthalic production represented by these plants is thus effectively barred from the free market. Therefore, while producers formerly supplying the requirements of these companies have been hit by a slump, overall demand for phthalic may be up. In

fact, production of phthalic anhydride in January of this year reached the highest monthly rate in history — 16,295,597 pounds.

PHTHALATE ESTERS

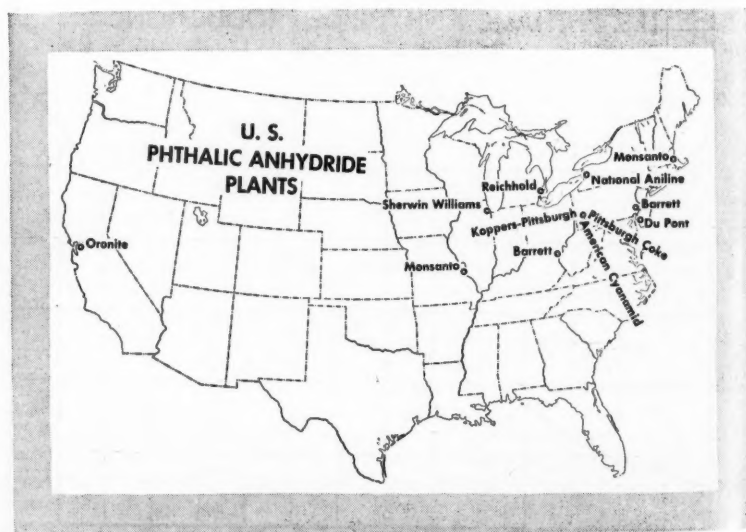
Except for a short time during the war, practically all phthalic ester production had been used for plasticizing vinyl plastics. In their final form, polyvinyl chlorides, which are sold in largest volume, contain one pound of plasticizer (usually a phthalate ester) for every two pounds of polyvinyl chloride. Thus, as vinyls go, so goes the demand for phthalic anhydride for ester formation.

The universal plasticizer probably will never be found; the plasticizer to be used depends a great deal on the principal properties desired in the plastic. However, it must be compatible with the plastic and remain incorporated in it for long periods of time under a wide range of conditions. These latter requirements mean low volatility, stability to heat and air, and resistance to the solvents with which it comes in contact. There are many other requirements, but they are important only for certain special uses.

At present dioctyl phthalate is the most widely used plasticizer. Although other plasticizers are better than DOP in some particular property, it has a wide combi-

U. S. PHTHALIC ANHYDRIDE PLANTS

Company	Location	Estimated Capacity Pounds Per Year
Allied Chemical and Dye Corp.	Frankford, Pa.	24,000,000
Barrett Division	Ironton, Ohio	25,000,000
Barrett Division	Buffalo, N. Y.	31,000,000
National Aniline Division	Bridgeville, Pa.	52,000,000
American Cyanamid Co.	Deepwater, N. J.	2,000,000
E. I. du Pont de Nemours & Co.	Kobuta, Pa.	15,000,000
Koppers-Pittsburgh Co.	Everett, Mass.	19,000,000
Monsanto Chemical Co.	St. Louis, Mo.	22,000,000
Monsanto Chemical Co.	Richmond, Cal.	10,000,000
Oronite Chemical Co.	Neville Island, Pa.	9,000,000
Pittsburgh Coke & Chemical Co.	Detroit, Mich.	13,000,000
Reichhold Chemicals, Inc.	Kensington, Ill.	2,500,000
Sherwin-Williams Co.		
Total		224,500,000



nation of properties that are difficult to equal. Source of the octyl group in the ester is usually the 2-ethyl-hexyl isomer produced by Carbide and Carbon Chemicals Corp. or the mixed octyl alcohols supplied by the Esso-Standard Oil Co. (*CI*, Aug. 1948, p. 211).

Forecasting the demand for phthalate esters depends on how bullish one is about the future of vinyl resins. Without question, the demand over the very long term will increase but the immediate future is very much up in the air. However, for the moment there has been an appreciable cutback in demand for phthalate plasticizers.

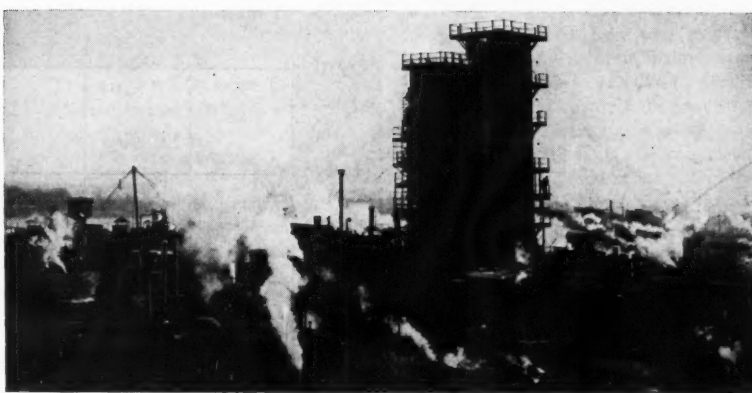
During the war a great deal of dimethyl phthalate—as high as 30,000,000 pounds in one year—was sold as an insect repellent. However, this use has dropped off to a mere trickle since the product now being used is usually an equal mixture of dimethyl phthalate, 2-ethyl hexanediol and indalone. The largest portion of this market seems to have been preempted by 2-ethylhexanediol.

OTHER USES

Of the other uses, requirements of phthalic anhydride for the production of dyestuffs is by far the largest. It is reacted with benzene to form anthraquinone, an important intermediate in the production of the light- and color-fast vat dyestuffs which represent a very sizable portion of this market. In addition, reaction of phthalic anhydride with ammonia produces phthalimide for the formation of the increasingly important phthalocyanine dyes and pigments. Although the textile market is momentarily in the doldrums, there appears to be no question that in the long run more phthalic will be needed for these uses.

PRODUCTION

Before World War I, phthalic anhydride was only a listing in *Beilstein*. In 1916 the present basic process, catalytic vapor-phase oxidation of naphthalene, was independently discovered both in Germany



Phthalic anhydride produced by Monsanto Chemical Co. at St. Louis, Mo.

by Wohl and in the United States by Gibbs and Conover of the U. S. Department of Agriculture. After much litigation, priority was assigned to Wohl; and the basic patent issued in 1934—eighteen years after the initial discovery—was assigned to the I. G.

First use for phthalic anhydride was in the manufacture of dyestuffs, which was followed by the production of phthalate esters in the '20s. Production was less than ten million pounds per year by 1929. The simultaneous development of alkyds and vinyl plastics (with their large demands for phthalate ester plasticizers) sparked the twenty-fold expansion in production that has taken place in the last twenty years. Projection of the production of the last three months over a full year indicates that current production is at a 190 million-pound-a-year clip.

Two years ago (*CI*, May 1947, p. 763) it appeared that a revolution in the phthalic anhydride industry was in the making. Oronite Chemical Co. was successfully producing phthalic from petroleum-derived *ortho*-xylene for the first time. Naphthalene was short and an almost unlimited supply of this alternate raw material was available at a relatively high price.

It seemed like an ideal time for petroleum companies to shoulder into this business. Distillation equipment that had been erected during the war to recover toluene from hydroformer product was available for the necessary fractionation of *ortho*-xylene which could be produced in the hydroformers by feeding C_8 cuts instead of the C_7 used for toluene. However, because of the relatively low content of the *ortho* isomer in the hydroformer product (15-30%), the cost of converting existing phthalic equipment to xylene use and increased availability of naphthalene, the raw material exchange did not come off. Continuous rectification of coal-tar fractions resulted in more naphthalene from this source, and increased imports also played a part in easing the supply situation. Of those producers who tested *ortho*-xylene in their existing oxidation equipment, all but one eventually decided against it. That one company is still using some xylene in its plant.

Use of *para*-xylene for the preparation of terephthalic acid, which is esterified with ethylene glycol to form the new synthetic fiber, Terylene (*CI*, May 1947, p. 764) may change this picture. A first step in any preparation of the *para* isomer would be removal of the *ortho* isomer, which could be sold more profitably as a phthalic raw material than as a solvent. However, this source promises only limited amounts of *ortho*-xylene at a price competitive with naphthalene at the expected reduced prices.

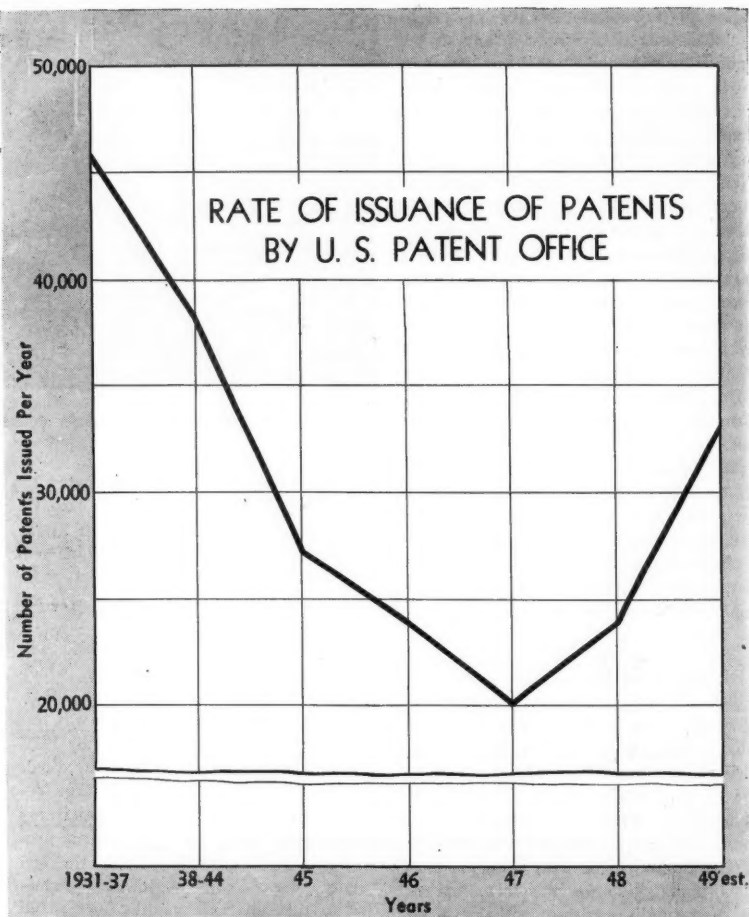
It is questionable if there will be any further large expansion of phthalic anhydride capacity within the next few years. Last year's 50-million-pound-per-year increase in capacity has enabled supply to catch up with demand. Until this large mouthful has been digested there will be little interest in further expansion. However, since the future for vinyl plastics is bright and the future for alkyds appears equally glowing, their expansion ultimately will call for more phthalic.



The largest phthalic anhydride plant in the United States is contained in this plant of the American Cyanamid Co. at Bridgeville, Pa.

THE PATENT OFFICE and courts seem to be changing their attitude to one of greater consideration for the inventor.

by ROBERT CALVERT
Patent Attorney
New York, N. Y.



CHANGING STANDARD OF INVENTION

Patent Office now allowing more patents

THE INVENTOR has been so buffeted by adverse decisions in patent cases that he no longer looks for an ending of the storm. He has seen the standard of invention made more and more exacting. He now fails to recognize the change to somewhat greater consideration for the inventor, a change that will be evident to most persons only when Patent Office statistics are assembled after the end of 1949.

PATENT ALLOWANCES INCREASING

The rate of issuance of patents at this time is increasing from its recent low. That the trend now is up is evident from the graph above. The number of patents, exclusive of reissue, design and plant patents, issued by the Patent Office declined to 20,137 in 1947, the smallest number in many years and less than half the pre-war average. The number issued

is now back to an average of 629 weekly (for the first two months of 1949). This corresponds to an annual rate of 33,000 conservatively estimated for the present year.

The increase in number of patents now being issued is considered to be due not entirely to expertness and diligence of the patent examiners or to increased efficiency for which the present and the preceding commissioner are due much credit. The increase in allowances is attributed in substantial degree to a more normal attitude toward the inventor. The rule that in case of doubt as to patentability the doubt is to be resolved in favor of the applicant for a patent has recently been reemphasized. Commissioner Kingsland¹¹ in a recent address said:

"It is also my view where the question presents an honest doubt in the minds of the examiner as to the allowability of

claims, this doubt should, as far as possible, be resolved in favor of the applicant. This is for the reason that if the applicant is denied, at the threshold, his claim to an invention he is barred from ever obtaining a property right to which he may be justly entitled."

This ray of hope from the Patent Office should not be mistaken for a rainbow. It will still be difficult to obtain allowance of applications. It will be necessary in close cases to be able to answer in the negative at least one of these questions: Would the expert in the art in advance of the applicant's work have been expected to try what the applicant has done? Would this expert, having tried it, have found the applicant's result?

ATTITUDE OF THE COURTS

The attitude of the courts, quite properly, is also one of great strictness as to the standard necessary for invention.

Here also there is reason for hope.

Instead of "knocking out all patents," as the situation is sometimes summarized, the Supreme Court in the three years and two months since January 1, 1946, has held only four patents invalid. In one of those four cases, the decision turned not on the question of invention but on the language used in the claims⁹. Since there are many hundreds of thousands of presently unexpired patents, this holding of four patents invalid, one of them on a technicality, seems not to justify any impression that patents as a whole are doomed. It is true that only two patents were held valid and infringed as to some or all claims during this same period. In the first two months of 1949, the Supreme Court has held one patent valid as to most claims at least and one patent invalid.

That the record of patents recently before the Supreme Court on the issues of validity and infringement is about on a par with the average since 1900, and seems to be possibly improving somewhat is shown in the accompanying table.

RECORD OF PATENTS BEFORE THE SUPREME COURT AS TO VALIDITY AND INFRINGEMENT ONLY¹⁰

Years	Total Number of Cases	Valid %	Invalid or Non-Infringed %
1900-05	9	22	78
1906-10	7	43	57
1911-15	4	100	0
1916-20	16	31	69
1921-25	14	21	79
1926-30	12	25	75
1931-35	14	21	79
1936-40	15	0	100
1941-45	18	11	89
1946-3/1/49	6	33	67

In considering this table, it should be recognized that the Supreme Court has declined to hear and, therefore, has not set aside many cases in which the decisions below held patents valid. The Court has held for the patent owner in many cases also in which validity and infringement were not involved.

NEED FOR RISING STANDARD OF INVENTION

The encouraging signs of the immediate present are to be accepted as a slight reaction from a temporary swing even beyond the normally steep trend toward higher standards of invention. This trend is as it should be.

Just as the industry of talking machines would probably have failed by this time had there been no improvements over the first horn device of Edison, so the patent system would undoubtedly have failed and in fact should have been discarded long ago if there had not been introduced new requirements for the issuance of patents. The patent system has survived and should survive so long as the courts through the years keep the measure of the contributions required for

patents commensurate with the skill that becomes increasingly available for making inventions.

"The greatest invention of all," says Waldemar Kaempffert¹, "is the scientific method. Unknown men in laboratories are now the wonder workers."

Frank A. Howard² observes that, in an environment of organized research and development, the inventive mind reaches a level of productiveness beyond all past experience.

The standard of invention will keep pace with this constantly new level of productiveness of the inventive mind.

PRESENT REQUIREMENTS FOR INVENTION

Invention has been defined by Judge Learned Hand³ as a new display of ingenuity beyond the compass of the routine. To be invention, what is done must not have been obvious in advance to one skilled in the art to which the invention relates.

The "flash of genius" doctrine seems to be pretty much overlooked at this time. This was the requirement once stated that the new invention, however useful it may be, must reveal a "flash of creative genius," not merely the skill of the calling⁴. The patent law is aimed at animating a lower order of imagination and skill than that⁵. Earnest methodical research is still recognized by many courts as a satisfactory method of arriving at invention.

Perhaps the best test of invention is whether others had all along a strong incentive to discover but failed to find what the patentee has discovered though it lay all the while beneath their very eyes. Even such evidence of success where others have failed to meet a long existing need is not sufficient, however, to prove invention when the court finds invention clearly lacking⁶.

SUBJECT MATTER NO LONGER PATENTABLE

Along with the rising standard required for invention in general, there have been a number of decisions which rule out whole classes of subject matter.

New uses of an old composition are no longer patentable in claims to the composition. Claims held valid in 1915, were directed in effect to an electrical resistance heating element consisting of the old alloy Nichrome⁷. It has now been held that an old composition may not be patented for a new use unless the composition is modified from its closest previously known form⁸. It is still possible to claim a new use of a composition if the composition is modified even to a minor extent, as by being dissolved in a solvent, diluted with an extender, or used in a mixture in certain proportions, provided the solvent, extender, or proportions are new with the compositions

used and provided, of course, there is invention in the use. New uses may also be patented in the form of method claims.

"Means" claims exclusively are no longer considered valid. Previously it was permissible to recite in patent claims only a combination of various "means" for accomplishing certain functions. Now the Supreme Court⁹ has held such claims to be invalid; the structure, at the exact point of novelty, must be recited definitely, not stated merely as means for accomplishing the desired result.

New chemical compounds, which previously were patentable with little if any restriction, are now patentable over a close homolog ordinarily only in case the new compounds show an unexpected property making the compounds superior over the homolog for some useful purpose.

SUMMARY AND POLICY AS TO PATENTS

The attitude of the Patent Office and the courts toward the inventor seems not to be increasing in strictness and to show at the moment perhaps some moderate signs of relaxation.

Friendliness or hostility to the patent system may safely be expected to go hand in hand with the attitude toward private capital in general, of which patents are but one form.

The standard of invention may be expected to continue to rise over the long term with the rising level of technical skill of the inventing public.

Company policy as to patents may be based wisely on the assumption that the patent system will remain as an important feature of our industrial and scientific world. Developments that are weak both as to patentability and prospects for commercialization seldom justify filing for patent upon them. Careful consideration should be given, on the other hand, to developments that are strong both as to probable patentability and commercial usefulness. In the marginal area of commercial promise coupled with apparent weakness from the patent standpoint, invention may be found to reside in some feature other than the one of primary importance.

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 2. Chem. Digest 1948, No. 2, page 3.
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 5. Dewey & Almy Chemical Co. v. Mimex Co., 52 U.S.P.Q. 142.
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 10. The data for 1900-1940 is from an article by Judge Evans, 24 J.P.O.S. 19. Data for 1941-1945 is from Cullen, 28 J.P.O.S. 903.
 11. Address before National Association of Manufacturers, December 3, 1948.
- Abbreviations:
 F. = Federal Reporter
 U.S. = U.S. Supreme Court Reports
 U.S.P.Q. = U.S. Patents Quarterly
 J.P.O.S. = Journal of the Patent Office Society

Non-Destructive Measurement of Wall Thickness In Chemical Process Equipment

by S. D. ROSS
Brown Instruments Division
Minneapolis-Honeywell Regulator Co.
Philadelphia, Pa.

NEW ULTRASONIC, ELECTROMAGNETIC, RADIOGRAPHIC and electrical conductivity measuring instruments now permit rapid and accurate measurement of wall thicknesses. Access to only one side is required.

MANY corrosive and abrasive materials used in the chemical process industries present a real problem in maintaining safe wall thicknesses of equipment. Vessels and pipe lines carrying dangerous chemicals, often at high temperatures or pressures, must be checked periodically to guard against flaws which develop in service. Yet, until recently, testing methods were costly, largely because they interrupted production and were time-consuming.

New instruments utilizing electronic circuits can determine, non-destructively, the thickness of metallic or non-metallic walls, with access to the outside of the vessel or pipe the only requirement. Thus, it is not necessary to drain a tank for visual inspection or to drill numerous test holes to mechanically gage the wall thickness. In current practice an operator merely places the detecting element of a small portable device against the wall, and, after making a few simple knob adjustments, reads the thickness on a dial—all in a matter of minutes.

Of the various models commercially available today for thickness gaging, only those commonly applicable to *wall thickness measurement* from one side are considered in the present article. They are listed in Table I. Other types are offered for the continuous measurement of thickness of moving sheets of steel or other materials, but a part of their measuring element must be located on each side of the sheet.

ULTRASONIC METHODS

Stemming from the Sonigage developed by Dr. Wesley S. Erwin, of the General Motors Research Laboratories,¹ several devices which utilize ultrasonic waves are being manufactured under licenses from General Motors. In these instruments the wall is vibrated locally at high frequencies which are varied over

a range to determine the *fundamental natural frequency* of vibration of the wall. This factor is a function of the wall thickness, just as the tone of a pipe organ is dependent upon the pipe length, and is essentially independent of other physical dimensions of the material.

To illustrate the character of frequency vibrations in the wall and their relation to thickness, consider a piece of string having a length equal to the wall thickness to be measured, being shaken back and forth as shown in Fig. 1. The string will assume the shape shown in *a*, at only one frequency—the fundamental frequency. Certain increased vibrating frequencies, however, will produce two or more nodes (harmonics), as shown in *b*, *c*, and *d*, of Fig. 1. As noted on the diagrams, these frequencies are multiples of the fundamental frequency *f*. Thus, if the frequencies of two adjacent harmonics

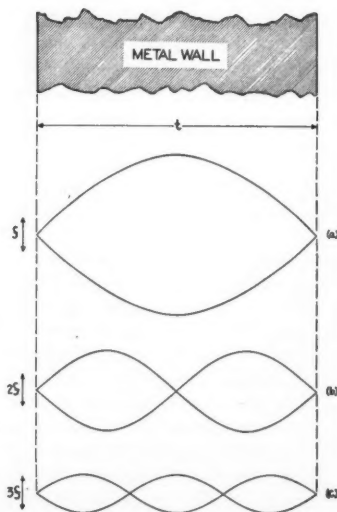


Fig. 1. Principle of ultrasonic sound waves at resonant frequencies.

are known, the fundamental frequency can be found by difference, for example, $3f - 2f = f$.

The force producing the vibration of the string can have various frequencies, but the cycle formations illustrated will take shape only at the fundamental or harmonic frequencies. When they form, the vibrating source and the string are said to be in *resonance*. In the application of ultrasonic thickness gages, a *quartz crystal*, the vibrator, is placed in contact with the wall, and resonance conditions are determined by various means.

The fundamental frequency is related to the wall thickness by the formula:

$$t = \frac{V}{2f} \quad \text{where}$$

V = velocity of the sound wave in the metal in inches per second.

f = frequency of the fundamental wave length in cycles per second.

t = thickness of the wall in inches.

AUDIO DETECTION

In the Audigage, produced by Branson Instruments, Inc., the quartz crystal is made to vibrate at different frequencies by an electronic oscillator. The operator turns a knob on the instrument case (Fig. 2) and when the crystal vibrates at a frequency which corresponds to a natural frequency of the metal plate, the instrument produces an audible tone due to the relatively large increase in the amplitude of the sound wave. The operator picks up this tone in a set of headphones.

A transparent plastic pointer, moved by the frequency adjusting knob, indicates on a concentric scale of graduated frequencies the values of two adjacent harmonics thus determined. From these, the fundamental frequency is found by subtraction; and, in the case of steel, a conversion scale concentric with the frequency scale, enables the operator to read the thickness directly. Since the velocity of sound varies with different materials, the thickness of other materials may be measured by applying an appropriate factor to the scale.

The acoustic method of determining the

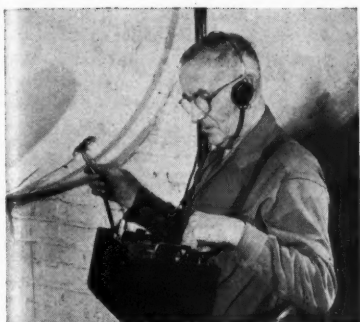


Fig. 2. Operator measuring tank wall thickness with the Audigage.

resonance conditions permits the Audigage to be used for measuring steel thicknesses over a range from $\frac{1}{16}$ inch to 12 inches with accuracies within 3 per cent of the actual wall thickness. Complete with batteries and accessories, the instrument is housed in a portable, luggage-type case weighing only 23 pounds. For use in noisy locations, a milliammeter on the instrument panel indicates resonant frequencies by an increase in deflection. The instrument has found wide use in petroleum refineries as well as other chemical processing plants.^{2, 3, 4}

OSCILLOSCOPE

The Sonizon of Magnaflux Corp. (Fig. 3) also utilizes ultrasonic waves but resonant frequencies are determined by a cathode ray tube. These frequencies appear as one or more sharp vertical peaks in a horizontal line of light across the face of the tube. For steel walls, from 0.010 to 0.400 inches thick, the scale markings across the tube are calibrated to indicate thickness in inches and only one curve peak appears on the tube at the thickness value.

If other metals—such as brass, aluminum, or copper—are to be regularly tested in this same range of thicknesses, suitably calibrated scales can be obtained. For infrequent tests of different metals, however, it is simpler to use a factor to convert the reading on the scale calibrated for steel. This factor, as in the case of the Audigage, is based on the speed of sound in the material measured, as compared to that in steel.

Wall thickness between 0.400 and 4.00 inches produce two or more harmonic peaks in the tube curve. Readings of any two of these peaks are taken, and a simple arithmetical calculation gives the wall thickness, the product of the two readings divided by their difference.

Stemming from the same basic development as the previous devices, the Sperry Supersonic Reflectoscope was designed more specifically to check metals for internal defects as a means of quality control. It also employs principle of a vibrating quartz crystal with an oscilloscope screen to locate the defect.

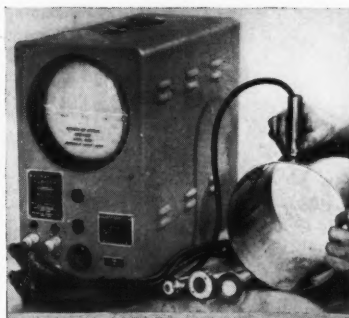


Fig. 3. Sonizon instrument with crystal probe measuring wall of an 8 inch pipe.

For inspection of welds in ferrous and light metals, the device utilizes a type of searching unit which causes the sound beam to enter the welded part at an

angle such that a lack of bond, inclusions, or voids can be detected with extreme sensitivity. The weld metal itself does not affect the reading. With the proper testing frequency, the unit is capable of detecting defects one or two thousandths of an inch in diameter at distances up to six inches from the crystal.⁵

RADIOGRAPHIC METHODS

Devices employing radioactive materials for the determination of wall thickness have recently come into use. Both radium salts and radioactive isotopes are used. One such device called the Penetron* comprises a detection head (Fig. 4) connected through a flexible rubber-covered

* The Penetron was designed by Texaco Development Co. and licensed for manufacture by Engineering Laboratories, Inc., who have appointed Instruments, Inc., as exclusive sales agents.

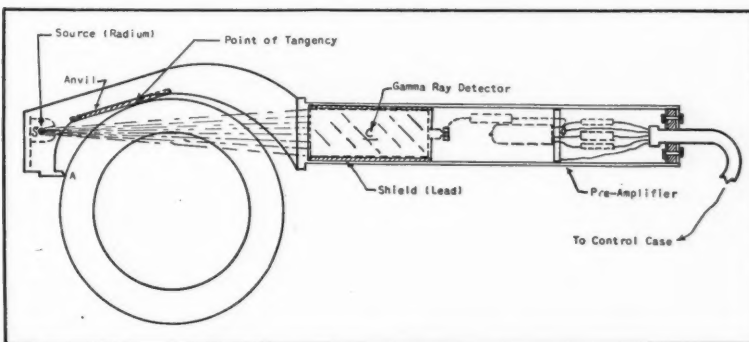


Fig. 4. Diagrams of the Penetron "tangential" detector head.

TABULAR SUMMARY OF THICKNESS MEASURING MEANS

Basic Method	Tradename	Materials Tested	Thickness*	Accuracy	Notes
ULTRASONIC	Audigage	Solid metallic or non-metallic	$\frac{1}{16}$ " to 12"	$\pm 3\%$ (can be less than 1%)	Provides visual and audible means of measurement
	Sonizon	Solid metallic or non-metallic	0.010" to 0.400" (direct) 0.400" to 4.0" (indirect)	$\pm 2\%$ or less	As with Audigage, use of curved crystals improves meas. of smaller pipes (12" or less)
	Reflectoscope	Welds in ferrous and light metals	Up to 10'	0.001" dia. defect detected at depth of 6"	Not normally used for thickness meas. <i>per se</i> .
RADIOGRAPHIC	Penetron	Metallic or non-metallic	Up to 0.75" (standard hd) Up to 0.90" (tangential head)	$\pm 3\%$	For pipes with radius of curvature over 2" tangential head is used
	(Ford research devices)	Metallic or non-metallic	Up to $\frac{1}{16}$ " in tests		Radioactive isotopes used were not deemed too satisfactory ⁶
ELECTROMAGNETIC	G-E Pipe Thickness Gage	Magnetic iron or steel	Up to $\frac{1}{4}$ " for pipe diameter between 1" to 2"	$\pm 1/64$ "	Limited to small diameter pipes
	Probolog	Non-magnetic materials			
ELECTRIC CONDUCTIVITY	Scott Electroflux Thickness Gage	Any electrically conducting material	0.125" to 2.25"	$\pm 3\%$	Provides average thickness under probe regardless of corrosion of under surface

* Given in terms of steel

cable to a control case which contains electronic components and indicating meter. The entire assembly is quite portable, weighing approximately 40 pounds.

The Penetron may be furnished with one of two detector heads. The *standard head* is used for flat surfaces or slightly curved plates (radius of curvature over two inches), while the *tangential head* is intended for pipes, elbows and the like.

With the standard head, the radioactive source in the form of one milligram of a radium salt is contained in a needle protected by a shield from a Geiger-counter type detector (see Fig. 4). Gamma rays produced by disintegration of the radium are of such a short wave length that most of them pass completely through the wall. Some, however, strike atoms in the wall and cause secondary gamma rays to be emitted in all directions. A small opening on the side of the detector admits back-scattered rays, the number of which bears a definite relationship to the wall thickness.

The secondary gamma rays, upon striking the detector, set up minute electrical impulses which are amplified many thousands of times, averaged for accuracy. These impulses cause a deflection on a microammeter. A curve previously plotted from known thicknesses of the material under test is used to convert meter readings into definite thicknesses. Readings obtained in this manner are said to be accurate within three per cent, regardless of the molecular structure, heat treatment, or alloy content of the material being measured. These calibration curves have to be established only once and can be furnished with the instrument. Non-metallic materials such as Bakelite and wood as well as such non-ferrous metals as aluminum and lead can be measured by

the Penetron with suitable calibration curves.

With the tangential head, measurement of a pipe wall thickness depends, not upon the back-scattered radiation, but rather on the amount of gamma-ray energy lost in passing tangentially through a portion of the pipe wall, as illustrated. Otherwise, the measuring system is identical for the two heads.

Because secondary gamma rays are less penetrating than the primary rays, approximately 0.75 inch of steel is the maximum thickness which can be measured with the standard head. On the other hand, the use of primary gamma rays in the tangential head permits much greater thickness measurements, although for practical purposes the present head was designed for reading thicknesses of steel up to only 0.90 inch with pipe diameters up to 12¾ inches.

It is inherent in this method of detecting radiation as a measure of thickness that the readings are an average of the thickness over a square inch of material. Also, a calibration curve drawn to read thickness of a pipe or vessel filled with air cannot serve for readings of the container filled with some liquid, but similar curves with the liquid in question can usually serve the same purpose.

Similar in principle to the Penetron is the method developed by Ford Motor Co. research engineers⁶ to measure the thickness of steel. They used radioactive isotopes* in conjunction with Geiger-counter equipment. A recording potentiometer provided a permanent record of the output from the counting rate meter and cut down on the time required for the tests. Similar use has been made of an electronic

* Cobalt 60 and Selenium 75 were specifically used in the tests reported.

recorder with the Penetron in the form used for measuring liquid levels of very corrosive fluids in vessels (termed the Gagetron⁷) and could be adapted equally well for thickness tests in the laboratory where portability is not a factor.

ELECTROMAGNETIC METHODS

For determining the wall thickness of relatively small diameter magnetic iron or steel pipe, an instrument that utilizes magnetic flux in its operation has been developed by the General Electric Co. Known as the *G-E Pipe Thickness Gage, Type MS-A*, it comprises (1) an *indicating unit* to read thickness, (2) a *gage head* with a handle, and (3) a *saddle* curved to fit the diameter of pipe being measured (see Fig 5).

The gage head consists of a pair of concentric poles of Alnico 5 which supply sufficient total flux to saturate the area covered by the poles. With a fixed area, the total flux required to saturate the magnetic material is dependent only upon the thickness, and this relationship is the means of measurement. The flux moves the indicating pointer over a scale calibrated in fractions of an inch so that the thickness can be read directly.

This method is limited to thickness of pipes up to ¼ inch and diameters from 1 to 2 inches. It will tolerate a normal amount (approximately 4 mils) of surface or inside dirt, scale, and paint without appreciable effect on the thickness indication. An accuracy of plus or minus ¼ of an inch can be obtained on clean surfaces, whereas plus or minus ½ of an inch is to be expected on dirty surfaces. A separate saddle, easily attached to the gage head by two screws, is required for each size of pipe.

The *Probolog*, developed by the Shell Development Co., is an electromagnetic probe-type device which detects and records all types of corrosion conditions and irregularities in *non-magnetic* tubes. It consists of (1) a probe, (2) an electronic recorder, (3) a mechanical probe puller and (4) a tube standard.

The probe is the sensing element of the instrument, containing a stainless steel clad electromagnetic pickup unit. In the electronic recorder a clock motor synchronized with the movement of the probe through the tube (4-12 feet per minute) drives the strip chart. The tube standard is used to check the overall performance of the instrument. The result is a strip chart with a very large deflection at any irregularity in the tube wall.

ELECTRIC CONDUCTIVITY METHOD

The Scott Electroflux Thickness Gage* determines wall thicknesses from ⅛ inch to 2¼ inches by means of the electrical

(Turn to page 686)

* Manufactured by Robert Scott, Belmont, Mass.

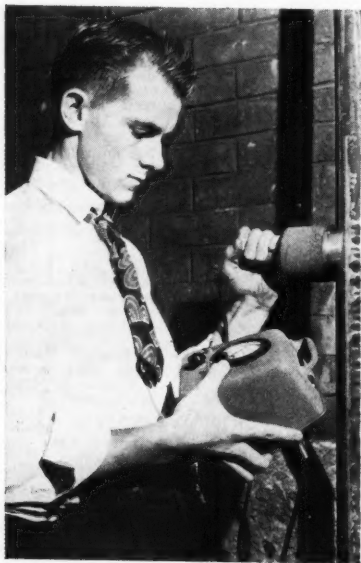


Fig. 5. G. E. Thickness Gauge being used to check pipe thickness.

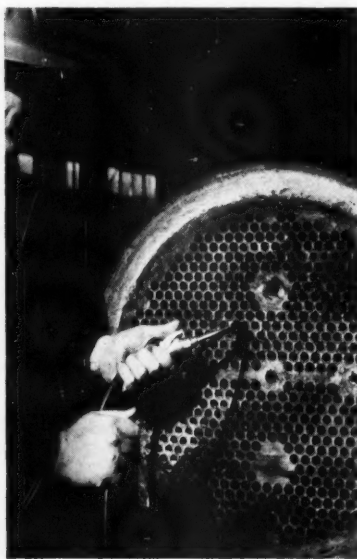
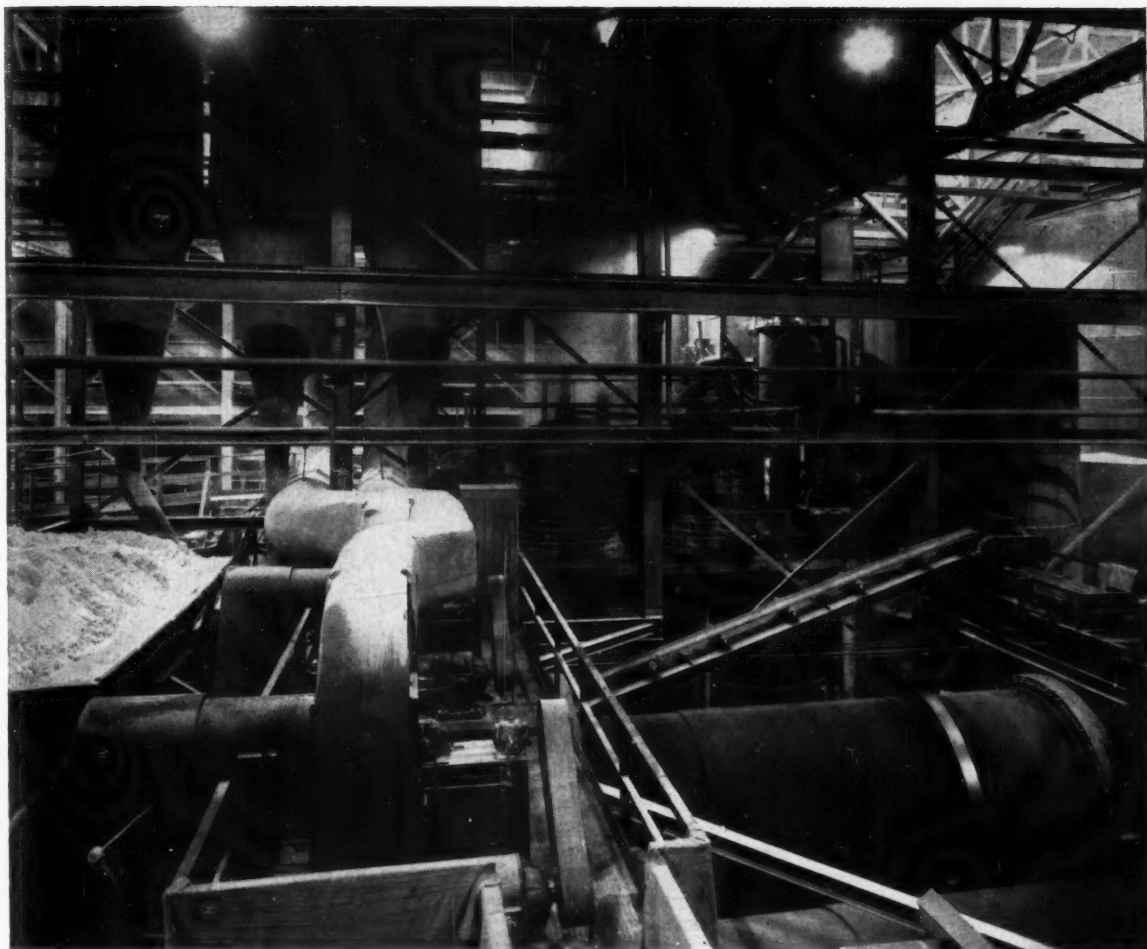


Fig. 6. Air injection of Probolog probe through heat exchanger tube.



General view of dry end of new phthalic catalyst process at Curtis Bay (Baltimore) works of The Davison Chemical Corp.

German Phthalic Anhydride Catalyst Now Manufactured in U. S.

by N. E. HATHAWAY and O. D. MYRICK
The Davison Chemical Corp.
Baltimore 3, Maryland

GERMAN-DEVELOPED CATALYST, an impregnated silica gel containing vanadia and potassium sulfate, gives 95% of theoretical yield of phthalic.

THE ADAPTATION of American Catalyst technology to the manufacture of a German-developed phthalic anhydride catalyst is one of the first instances of commercial utilization in this country of a German war discovery.

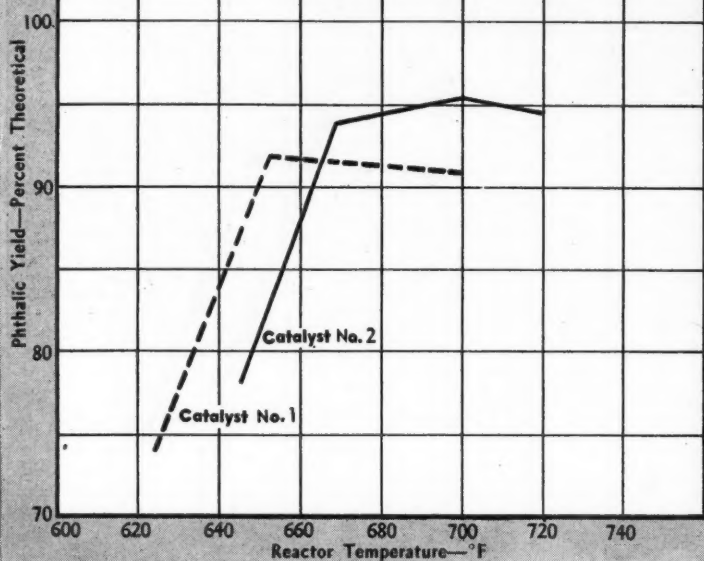
Yields claimed for the German catalyst indicated it to be far superior to those generally employed in the United States. Theoretically, on equivalent weights, 128

parts of naphthalene should produce 148 of phthalic anhydride, or 1.16 pounds of phthalic anhydride per pound of naphthalene charged. FIAT and BIOS reports and observers from Germany have indicated yields of one pound of crude phthalic anhydride per pound of naphthalene charged, with purities of 97 and 98%. The Germans also claimed a 10-year catalyst life.

German claims for the catalyst interested many American phthalic anhydride producers, and The Davison Chemical Corporation, on the basis of previous catalyst manufacturing experience, was consulted regarding participation in a mutual development program.

In the familiar stepping stone of organic chemical reactions, phthalic anhydride has become the center of many branches to many products. Alizarin and derivatives; fluorescein, eosine and rhodamine dyes; glyptal and rezyl type resins; and phthalate esters are but a few of the colorful products.

PERFORMANCE OF TWO VANADIA-POTASSIUM-SULFATE TYPE PHTHALIC ANHYDRIDE CATALYSTS



Originally, naphthalene was oxidized to phthalic anhydride by means of fuming sulfuric acid as the oxidizing agent with mercuric sulfate as the catalyst. Oddly, this catalyst was discovered by accident when a chemist broke a thermometer in a beaker containing sulfuric acid and naphthalene. Present day commercial catalytic oxidation of naphthalene uses air and was developed along more conventional research lines. The catalyst increases the rate of oxidation of naphthalene and controls the extent of the oxidation to produce the maximum quantity of phthalic anhydride. Partial oxidation of naphthalene results in the formation of naphthoquinone, whereas over-oxidation produces a splitting off of carbon dioxide from the phthalic anhydride with the formation of benzoic acid, and continued oxidation accompanied by rupture of the benzene ring results in the formation of maleic anhydride.

Previous commercial catalysts consisting of vanadium pentoxide deposited on some suitable support gave a conversion of better than 80% and a life of six months or more. Pumice and infusorial earth were tried as catalyst supports, but their poor heat conductivity lowered the catalyst activity and the catalytically active salts which were used in the impregnation displayed a tendency to react with the pumice support.

The German catalyst is an impregnated silica gel containing vanadia and potassium sulfate. It was determined during

the early development and laboratory stages that the carrier was of significant importance. The Germans utilized silica gel widely as a catalyst and catalyst carrier because of such physical factors as surface area, ruggedness, selectivity, etc.

The variables in the manufacture of silica gel must be closely controlled when it is intended as a catalyst or catalyst support, for they appear to exert a marked influence on catalyst efficiency. In this case, the carrier is prepared by the mixing of potassium silicate and sulfuric acid under careful control. Usual safety and corrosion prevention practices required in

the handling of these materials are necessary. Unlike the manufacture of normal silica gel, the salts (K_2SO_4) remain in the hydrogel and are not washed out. The German process stipulated a filtering off of the excess water and drying at a temperature of 110°-120° C. for 24 hours. It was determined that the economics favored elimination of the filtering step, with the substitution of a direct drying step under controlled conditions. Since the influence of iron on catalyst activity and life was not known special precautions were enforced to insure an uncontaminated product.

The process above differs from that employed in the manufacture of normal silica gel. However, the experience gained over the last 30 years enabled the utilization of existing equipment with slight modification. It was necessary, to insure thorough impregnation, to reduce the particle size of the dried product as the final step prior to impregnation. This type of silica gel is considerably softer during all stages of manufacture than that normally encountered. Because of this fact, losses throughout the stages are high.

The German process prescribed the impregnation of the carrier with vanadyl sulfate to achieve a final concentration of V_2O_5 of 10%. Literature and reports available conflict on the method of preparation of the impregnating solution and the method of impregnating. Considerable research and experience in catalyst manufacture were needed to fill the gaps in the published literature. Ideally, the proper approach would be through a pure commercial vanadyl sulfate. Unfortunately, American vanadium sources had very little previous call for $VOSO_4$, and the material was available only in laboratory quantities.

High purity of all materials is a necessity in almost all catalytic work. To secure the high purity necessary, ammonium meta-vanadate was selected as the starting point. V_2O_5 was precipitated



Sherwin-Williams Co.'s phthalic anhydride plant, Chicago, employs the new catalyst.

from a solution of ammonium metavanadate, filtered, washed, and converted to VOSO_4 by means of sulfuric acid and bubbling SO_2 .

Materials of construction in the preparation of the solution varied from lead lined tanks to special agitator blades. Some glass was used.

CATALYST IMPREGNATION AND DRYING

As stated above, the special silica gel carrier was finely divided to insure an even impregnation. Davison's previous catalyst experience, both in the petroleum "fluid" cracking catalyst and other specialty catalysts, reduced the many problems. Safety precautions, as with the solution preparation, were necessary.

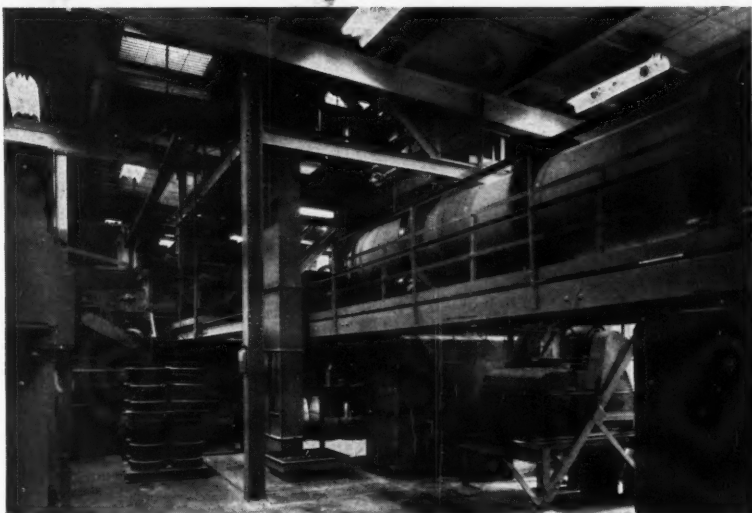
The German process was reported in several ways, but it was desired "to secure approximately 10% of V_2O_5 in the catalyst." The process as reported consisted of mixing the carrier and the impregnating solution to a thorough paste and then pressing the paste onto molding plates. "The molding plates are of stainless steel, 5 mm. thick, and approximately 400 mm. long by 200 mm. wide and contain 1,170 holes of 5 mm. diameter." These molding plates were then put in an oven at 50°C . for one to two hours. During this time, the evaporation of water and reduction of the VOSO_4 to V_2O_5 caused a shrinkage of the pills which facilitated their removal. The pellets were then dried in an oven at 100 – 150°C . and baked at 400 – 450°C . with heated air in a calcining furnace.

Davison's adaption of this technique did not differ markedly, with the exception of the pellet formation. The release of SO_3 fumes was of considerable concern, but fortunately calcining equipment already installed was constructed of materials satisfactory from a corrosion standpoint.

The German method of pellet formation was satisfactory but it is somewhat costly in this country. A method of satisfactorily compressing the activated powder in pellet form was developed, and current production is on automatic machines.

CATALYST PERFORMANCE

In any catalytic oxidation process, the temperature of the reaction is a factor in catalyst performance. In this oxidation reaction considerable excess of air over theoretical quantity for the formation of phthalic anhydride is used. The heat of oxidation to phthalic anhydride theoretically releases 5,460 Btu per pound of naphthalene, but since some complete combustion of naphthalene occurs, the total heat liberated is said to be about 10,000 Btu. This introduces a considerable heat exchange problem. In general, the reaction temperatures of fixed bed



The catalyst is pelleted on automatic machines and baked in this high-temp rotary calciner.

reactors at any given throughput are governed by reaction rate and the design of jacket heat-exchange equipment. Modifications in design affect the operating characteristics of each unit, and, consequently, the catalyst must be modified to give optimum performance in any given unit.

The carrier, percent vanadia, and vanadia-potassium sulphate ratio are three manufacturing variables that have considerable effect on catalyst performance. The accompanying graph shows the effect of reactor temperature on two silica gel vanadia-potassium sulphate catalysts of slightly different characteristics. Each of these catalysts was designed for a particular set of operating conditions.

In the catalytic oxidation of naphthalene with air, the reaction products obtained are phthalic anhydride, naphthoquinone, maleic anhydride and the complete combustion products; carbon monoxide, carbon dioxide, and water. In order to obtain the highest possible yield of phthalic anhydride, the oxidation reaction must be rigidly controlled and the catalyst specifically designed. Under-oxidation will produce relatively large quantities of naphthoquinone and low yield of phthalic. Over-oxidation will produce excessive maleic anhydride or the complete combustion products. Even under ideal conditions, however, some side products will result from the oxidation reaction.

The oxidation catalyst must be capable not only of increasing the rate of oxidation of naphthalene, but also of inhibiting or controlling the oxidation to minimize the formation of the side products, naphthoquinone and maleic anhydride. To accomplish these ends, the silica gel carrier contains (1) vanadium pentoxide, which is the catalytically active material that promotes the oxidation of naphthalene; and (2) potassium sulphate, which acts as

an inhibitor, controlling the severity of the reaction and preventing over-oxidation.

Variations of temperature, space velocity, naphthalene concentration, catalyst size, etc., as a result of plant design necessitate alteration of the catalyst, generally within the ranges outlined below:

V_2O_5 concentration: 8-12%.

K_2SO_4 to V_2O_5 ratio: 2:1 to 3:1.

Particle size: $\frac{3}{16}$ -in. pellets down to sizes suitable for fluidization.

One of the plants using the catalyst is that of the Sherwin-Williams Co. in Chicago, which employs a fluidized bed type of operation. Average time of contact between the naphthalene and catalyst in this unit is 10 seconds and the catalyst bed ordinarily contains about 25 lbs. of catalyst per pound of naphthalene fed per hour.

OUTLOOK

Contact time with the German type catalyst is longer than that employed with the conventional vanadia-alundum catalyst. Because of this, there has been some question as to the desirability of altering existing equipment to realize the economies given by higher yields and longer catalyst life.

Market surveys indicate trends toward rising raw material (naphthalene) costs and increasing demand for both naphthalene and phthalic anhydride during the coming decade. The economic advantage of high yields warrants consideration when altering present equipment and is of major importance in new construction.

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2. PB 81279—FIAT Final Report 649, Catalysts for the Manufacture of Phthalic Anhydride and Aniline by Roy W. Nash.
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National Rug Cleaner

Fig. 1—Synthetic detergents are replacing soap in plant cleaning.

Detergents for Rug Cleaning

by E. A. LEONARD, Assistant Chief
Product Engineering Laboratories
Alexander Smith & Sons Carpet Co.
Yonkers, N. Y.

GOOD RUG CLEANING compounds are easy to formulate when you know the construction and properties of rugs, cleaning methods and their detergent requirements, product evaluation tests, and the market.

AMONG all the common consumer textiles, carpets and rugs are the heaviest and undergo the most severe service conditions. They consist of a pile of upright yarns forming the face of the fabric, woven into a supporting back of cotton, jute, or rayon yarns. In the case of about 95% of domestic rugs and carpets, the fibers forming the pile or face are wool. The remaining 5% includes rugs with faces of cotton, nylon, rayon, Estron and Vinyon.

Although carpet production involving the non-wool fibers is small in amount, it is not negligible; nevertheless, this discussion is confined to wool-pile carpet because of its much wider use, and the special problem of developing cleaners for it. Cotton rugs are usually handled by laundry processes, and the other types have not yet been in production for a sufficiently long time to appear in considerable numbers at cleaning plants. Furthermore, their service properties and cleaning requirements have been studied by their respective manufacturers, using today's technological methods. Cleaning of woolen rugs, however, was a problem before modern methods of detergency investigation were developed, and was therefore built as an art on cut-and-try methods. For that reason, the subject of rug

cleaning is still a controversial one. The principles outlined here have been derived in large part from the results of several recent research projects on rug cleaning, and these principles summarize the knowledge of those closely connected with this work.

Rugs and carpets are of such great thickness, relative to other textiles, that they are three-dimensional structures. Moreover, since they are porous, their cleaning is a problem of soil penetration and distribution as well as kind and amount of soil. Overall soils on carpets may be classified as predominantly oily or sandy. In addition, the carpet may be spotted locally by a multitude of agents, the most common being foods, inks, and pets. A rug-cleaning detergent need not also be an efficient universal spot remover. Many agents cause spots not by their physical presence, but by reaction with the dyes in the wool to produce a color change. A detergent cannot of course correct such a condition, and the spotted tufts must be retouched with the dye or replaced with new matched yarn to restore the rug properly.

During its period of service, a rug or carpet, like everything else, gets dirty and worn. Color changes due to soiling make the rug look dull and destroy the

subtleties of the pattern. Repeated or prolonged compression lays the pile yarns over and flattens them. The content of foreign matter within the carpet structure increases, first at the top surface, and then throughout. This may be oily soot, sandy grit, or inert dust, but is usually a combination of all three. This process goes on regardless of routine cleaning measures until an equilibrium content of foreign matter is finally approached. At this point presumably the vacuum cleaner is removing foreign matter equal in amount to that which is deposited. (A picture of extreme soil penetration is given by Figure 2.) Particular foreign materials may be present in high concentration known as spots and stains, as noted above, and some of the wool-pile will be abraded away.

When these conditions become sufficiently annoying to the owner of the floor covering to cause him to spend time or money or both to correct the situation, he will arrange to have the rug cleaned.

RUG CLEANING PROCESSES

Cleaning aims at making the rug look as nearly like new as possible by reversing the changes which the fabric underwent in service, except for replacing the wool worn away. Colors should be restored to their original clarity and brightness, crushed pile should be straightened, foreign matter on and in the structure should be removed, and spots, if any, should be eliminated. This objective is an unattainable ideal only. No known cleaning process will completely reverse these for effects of service without producing some other undesirable effect. Such incidental damage is very possible, and can be avoided by proper selection of cleaning materials.

The cleaning process should leave in the pile no residue of a sticky nature that would cause dirt to adhere to it; that is, the rug should not soil more rapidly after cleaning than it did before.

The cleaning material should not leave a residual odor in the carpet, either a characteristic odor due to the presence of detergent or odor arising from mold and bacterial growth which occurs on the backing yarns with continued dampness. The latter condition can result if a residue of a detergent with deliquescent properties is left in the pile.

The cleaning material should not cause color bleeding or chemical damage to the fibers in the structure.

Pile distortion, caused by matting of pile fibers under the influence of mechanical action and aqueous lubricants, should not be increased by the cleaning process. This relates to the felting properties of wool, used constructively in fulling blankets and woolen clothing materials. In rug cleaning, the property is undesirable, and its effects are to be avoided as much as possible. There is a distinction to be made between pile crushing, which is the

laying of the pile by application of stresses, and matting, or felting, which results in the entanglement of the pile fibers with loss of texture and distinctness of pattern. Wool is hydrophilic, however, and is much more plastic when wet than dry. In order to correct pile crushing, therefore, the pile must be brushed up while wet. This action, particularly in the presence of a detergent solution, cannot avoid producing some matting and pile distortion—one reason that ideal rug cleaning cannot be achieved.

All the possible incidental defects noted are, of course, tied in with the process as well as the cleaning material. Before going into process details, the distinction between rugs and carpets should be made, for it has an important bearing on the cleaning method to be used. A rug is a floor-covering of pre-cut standard size, such as 9' x 12'. Carpet, on the other hand, implies indeterminate sizes needed to cover given areas, as a long corridor,

a theatre lobby, or a room. Carpeting often covers an area from wall to wall and is fitted around radiators, columns, etc. For small rooms it may be cut down from the smallest single piece which would cover the area, and in large installations, as hotel lobbies, it is assembled from narrow roll goods and fastened in place.

PLANT CLEANING

Of the three major rug cleaning processes, plant cleaning is largest in volume and most nearly approaches the ideal results when properly executed. Standard-size rugs and small carpet installations where the goods can be conveniently taken up are satisfactorily handled in this way.

When the rug arrives at the plant, it is run through a dry duster, which shakes loose dirt out of the pile preliminary to wet washing. It is then laid face down on a sloped concrete floor which has a drain, and is hosed with water, turned

over and hosed on the face. A pail of detergent solution is poured on the face and the rug is brushed with a power-driven rotary brush of 12" to 18" in diameter to work up a heavy foam, emulsifying grease soil and suspending inerts. In some cases the detergent solution is fed from a central tank through the machine directly instead of being separately applied to the rug. The detergent solution, foam, and suspended soil are flushed away with a hose and the rug is passed through a squeeze-roll. Depending on the operating technique of the particular cleaner, perhaps one, two, or three more rinses, each followed by passage through the squeeze-roll, may be used, possibly with the inclusion of an acidic buffer. Then the pile is brushed up, and the rug is dried. (Figure 1 illustrates the plant cleaning process.)

The most significant feature of this process in contrast with those to be described is that rinsing is employed. Hence no appreciable amount of detergent remains in the carpet after the cleaning. Removal of foreign matter is good, due to the thorough wetting of face and back and the flushing action employed. (Figure 2 shows the thoroughness of soil removal in cross section.)

TREND TO SYNTHETICS

Soap solutions have been the traditional detergents for this work, but trends to other materials are evident. High-titer soaps, which were hard to rinse, had given way by 1940 to low-titer liquid "coconut-oil" soaps. Because solutions of these are less viscous, they are easier to distribute through the pile and rinse out more easily.

Since the end of the war, synthetic detergents have made considerable inroads in plant cleaning usage. Soap may perhaps be a somewhat better detergent than most synthetics under ideal conditions, but few plants have ideal working conditions. Water hardness and low water temperature are both serious stumbling blocks in many plants. Few have the facilities for heating the large volumes of water needed, and fewer have water-softening equipment. In winter, the wash water may be 40° F., and even the lowest-titer soaps do not clean well or rinse well under such conditions. Total hardness of 100 ppm. or more in the water used is another sufficient criterion for the use of synthetic detergents instead of soap.

Where soaps are used, they are principally "neutral" soaps; that is, alkaline builders are not added. This, too, is the result of another trend. Strongly alkaline solutions chemically degrade wool by their protein hydrolysis reaction and cause bleeding of acid dyes. The latter is probably an electrical rather than chemical reaction. At its isoelectric point of 4.65, wool exists as an uncharged pro-

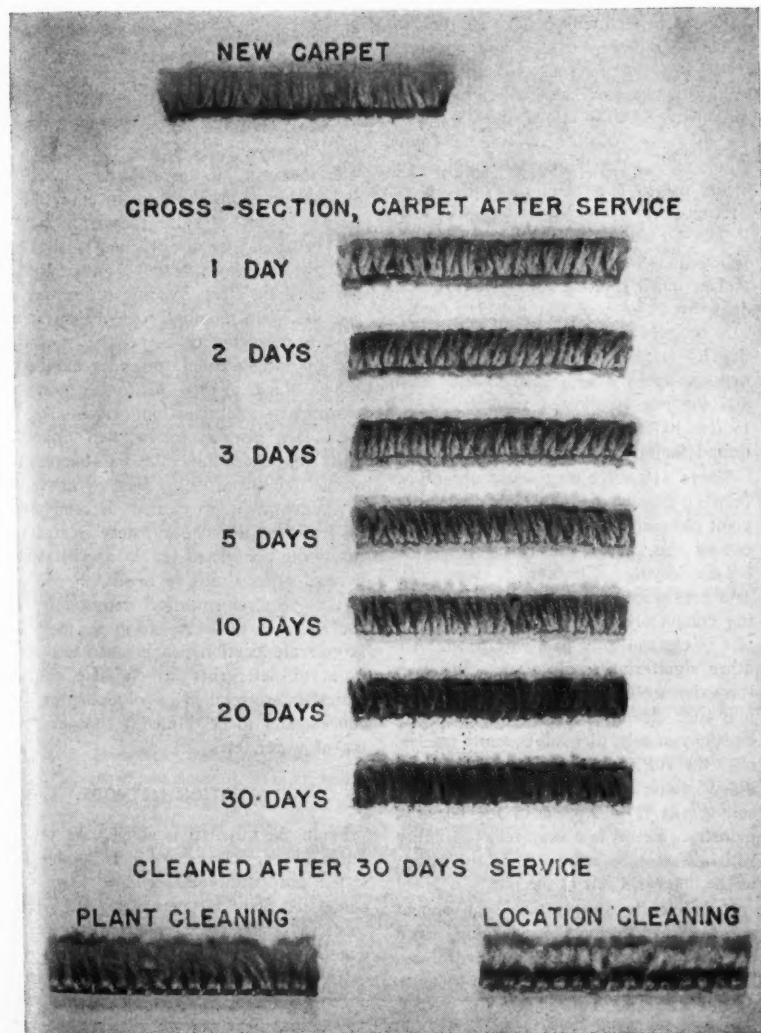


Fig. 2—Dirt, continuously penetrating despite daily vacuum cleaning, is best removed by plant cleaning. Conditions shown are extreme and do not indicate average soiling.

tein with ionized and unionized states in equilibrium. Reaction with acid causes the fiber to achieve a positive charge, and reaction with alkali, a negative charge. Acid dyes ionize to anionic agents and therefore are attracted to or "exhaust on" wool in acid solutions. Conversely they are repelled from or "bleed off" wool in alkaline solution. Since solutions of even neutral soaps have a pH of 9.0-9.5, color bleeding can occur and has been demonstrated to do so, the reaction rate increasing with temperature. Again, the procedure is involved. Rapid washing followed by quick and thorough rinsing causes no harm, but a rug cannot be left soaking in a soap solution for more than 15 minutes without color bleeding becoming evident.

The synthetics which have made most progress in plant cleaning are sodium salts of fatty alcohol sulfates (anionic); sodium salts of alkyl-naphthalene sulfonates (anionic); and ethylene oxide-alkyl phenol condensate polymers (non-ionic). The latter class of materials, which consists of liquids, has been shown by recent investigations to be very effective for cleaning wool.

Such synthetic detergents are generally used in combination with neutral salts or alkaline builders such as sodium metasilicate, sesquicarbonate, or trisodium phosphate. The builders presumably increase detergency and cause no damage to wool or color if they are rapidly rinsed away.

The detergents can be conveniently handled in liquid, paste, bead or spray-dried powder form. They should be readily soluble without flocculation in lukewarm water. The amounts of detergent commonly used will run in the neighborhood of 6 oz., anhydrous basis, per 9 x 12 rug of average construction. It is usually made up as a concentrate within a wide range, such that one or two gallons of solution is used per rug. Established costs for detergent run about 3.5¢ per 9 x 12, based on formulas such as:

(a) alkyl-aryl sulfonate (40% active, 60% sodium sulfate)	
1 lb.	15¢
sodium metasilicate, 1 lb.	3¢
Total, 2 lbs.	18¢
Cost/lb.	9¢
(b) sodium lauryl sulfate (80% active, 20% water), 1 lb. 24¢	
sodium sesquicarbonate ($\text{Na}_2\text{CO}_3\text{—Na HCO}_3$), 3 lbs.	15¢
Total, 4 lbs.	39¢
Cost/lb.	9.75¢
(c) neutral potassium soap (35% soap, 65% water), 1 lb.	
	9¢

LOCATION AND HOME CLEANERS

For those installations which are large and permanently fastened in place, as in theaters, hotels, and large offices, a growing practice of shampooing the carpet "on-location" has developed. Instead of taking the rug to the cleaning establishment, the cleaner trucks his equipment to the site of the installation and does his cleaning there.

First, the carpet is vacuumed thoroughly with a heavy industrial-type tank machine. Detergent is dissolved in 3-gallon pails and the solution poured into the tank on a power-driven rotary brushing machine. Detergent concentrations of 2% or 3% total solids are average. The carpet is shampooed with the brushing machine by feeding detergent slowly into the brush while the operator moves the machine over the carpet. He controls the brushing and detergent solution feed by observing the head of foam generated under the brush and the degree of color brightening on the carpet. The operator attempts to feed only enough solution for adequate cleaning of the pile; he must avoid soaking the rug through to the back for fear of causing shrinkage or prolonged drying time during which fungus can attack the backing yarns. Commonly-used volumes of solution run from one to two pints per square yard of carpet.

The power vacuum is used after the shampooing to pick up the soil-laden foam and as much solution as possible. About 10% by volume of the solution applied can be recovered. The remainder must dry by evaporation. Finally, the pile is brushed up by a long-handled stiff brush and the rug is allowed to dry. Twelve to twenty-four hours are usually required for adequate drying.

There are three significant differences between this location-cleaning process and plant cleaning: there is no complete wet-out of the carpet; no rinsing; and no hot-air drying. Cleaning is incomplete as a consequence of not wetting and rinsing completely; figure 2 shows that the pile is cleaned only part-way down. Another significant result of not rinsing is the existence of detergent residues in the pile after cleaning. Should these residues be sticky or oily, dirt subsequently tracked onto the rug will adhere mechanically as noted above and produce rapid "re-soiling" as it is termed in the cleaning industry. Re-soil is a very real possibility which is strongly influenced by the nature of the detergent left in the pile.

It is clearly shown that soap should not be used in location cleaning, since the acidity of most wool piles hydrolyzes the soap to its fatty acids, which promote rapid re-soil. The great majority of woolen carpets have acidic pile yarns since the acid dyeing is usually the last phase of wet processing. Liquid non-ionic deter-

gents of the type which have shown good results in plant cleaning are useless for location cleaning because they promote re-soiling.

The field of suitable detergents for location cleaning is therefore narrower than for plant cleaning, since soaps and liquid synthetics are eliminated. Further, the methods by which the remaining suitable synthetics may be built is restricted. Alkalies, many of which promote wool hydrolysis and would result in reduction of the carpet wear-life, should not be used. Only neutral salt builders are left, and these salts should not be hygroscopic for fear of promoting re-soil. Detergent costs run about 50% higher for location cleaning than for plant cleaning.

In spite of the narrow limits within which location-cleaning detergents can be compounded, good results have been obtained. The most suitable detergents are based on the sodium salts of fatty alcohol sulfates, noted above as useful for plant cleaning. Here, however, they are used straight or with sodium sulfate or sodium chloride builders. Sodium alkyl aryl sulfonates, also mentioned as useful in plant cleaning, are reasonably satisfactory for location cleaning. There are indications, however, that the latter do not have as good foam stability as the former. Since the operator of the brushing machine judges his detergent feed by observation of the foam and since the foam should not break before the vacuum pickup is brought into play (about 1-2 minutes after the brushing), the foaming properties of the detergent assume some importance. In this respect, the foam stability of the sodium fatty alcohol sulfate is excellent.

The third method of cleaning—home treatment—is carried out essentially in the same manner as location-cleaning with the exception that the operations are done by hand rather than by machine. A home vacuum cleaner is employed rather than the heavy duty industrial machine. The detergent is applied with a hand type scrubbing brush.

The requirements for detergents are the same in this case as in the case of large scale location cleaning and the same types of detergents are suitable. These materials are retailed as solutions, usually concentrates to be diluted 1 cup per gallon of water, etc.

EVALUATION METHODS

From the discussion above, the properties of rug cleaners which should be tested are readily discernible. They include, for plant cleaners: (a) pH; (b) cost; (c) solubility in cold and lukewarm water; and (d) cleaning ability.

For location cleaners the above are important but the range of suitable pH levels are lower and in addition the re-soiling qualities and foam stability should

(Turn to page 600)

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- ☒ 5 Take-Hold... plant food ☐
- ☒ 6 Tricalcium phosphate... conditioner for table salt and powdered sugar ☐
- ☒ 7 Victawet 35B, 58B, and 12... dye carrier and dispersing agents for textiles ☐
- ☒ 8 Tetrasodium pyrophosphate and sodium triphosphate... soap builders ☐

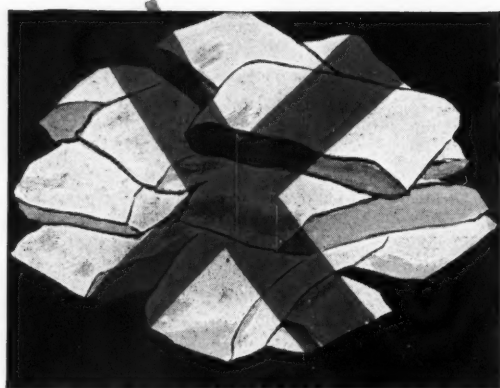
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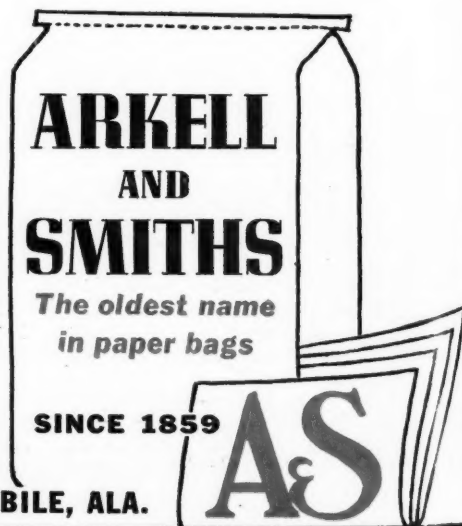
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THE CHEMICAL PANORAMA

NEWS OF THE CHEMICAL PROCESS INDUSTRIES IN PICTURES

PEOPLE



Francis J. Curtis (l.) and Carroll Hochwalt, elected members of Monsanto Chemical Co.'s board of directors. Mr. Curtis succeeds Gaston Dubois and Dr. Hochwalt succeeds Charles Belknap.



Walter E. Scheer, named general manager for the Organic Chemicals Dept., Warwick Chemical Co. Division of the Sun Chemical Corp.



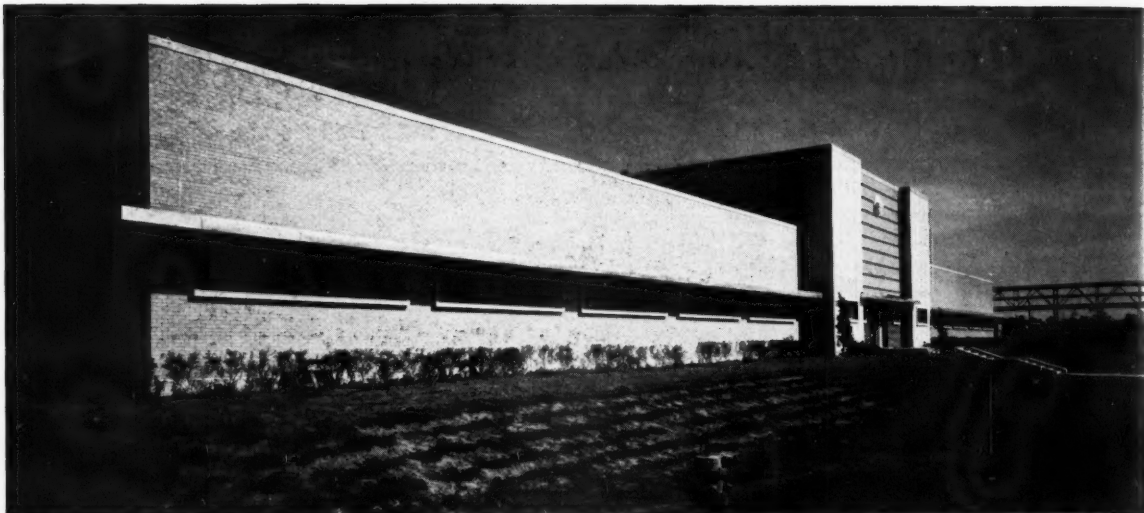
Theodore W. Evans, recently appointed director of research for Shell Development Co. He will be in charge of the operation and research program of the company's Emeryville laboratories.



G. W. Naylor, named manager of the Development Section, Chemical Division of Koppers Co., Inc.



Willard D. Peterson, who has become associated with Arthur D. Little as consultant in the fields of process development, photographic materials, and facsimile duplication.



The main section of the lab houses the analytical-experimental division, effluent control laboratory, library, offices, and stock rooms.

Control Lab for Gasolines

Shell Oil Co. has recently opened a new product control laboratory at its Houston refinery. Here lab chemists check all steps in refining for product quality and uniformity.

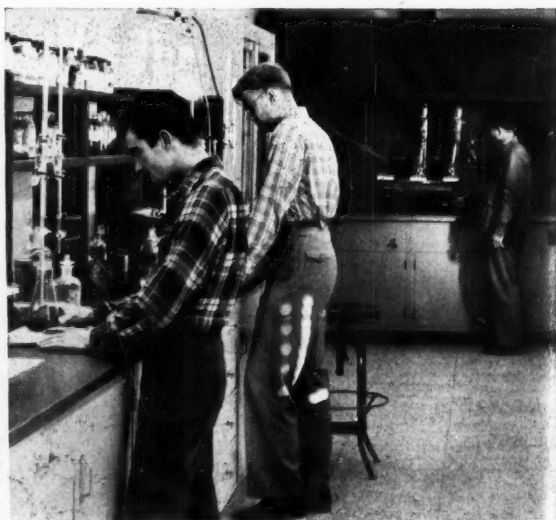
Extensive equipment for testing includes the Podbielniak and other precision distillation columns for specific analysis and evaluation; the motor laboratory for testing motor gasolines, aviation gasolines and diesel fuels; and oxidation and distillation apparatus.



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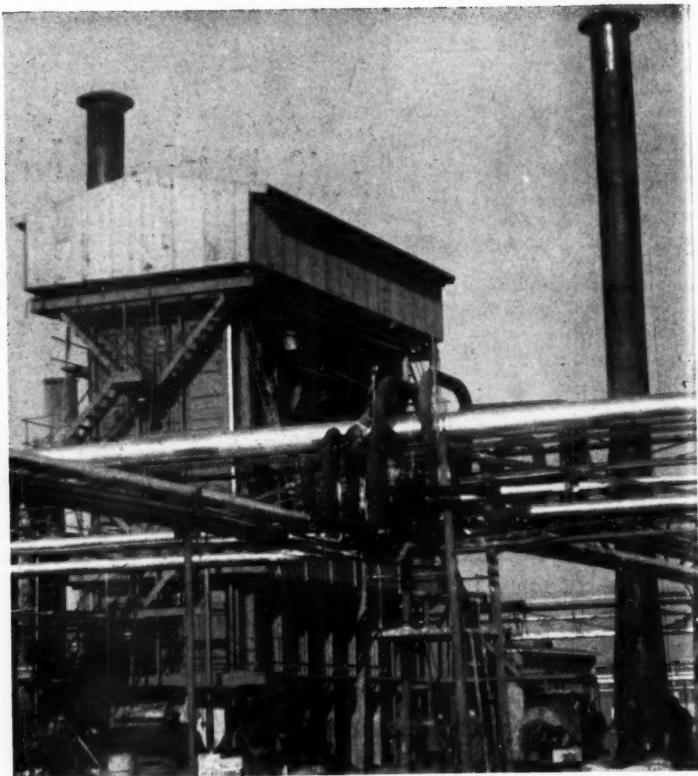
In Canada: Onyx Oil & Chemical Co., Ltd., Montreal, Toronto, St. Johns, Que.

Catarole Start-up

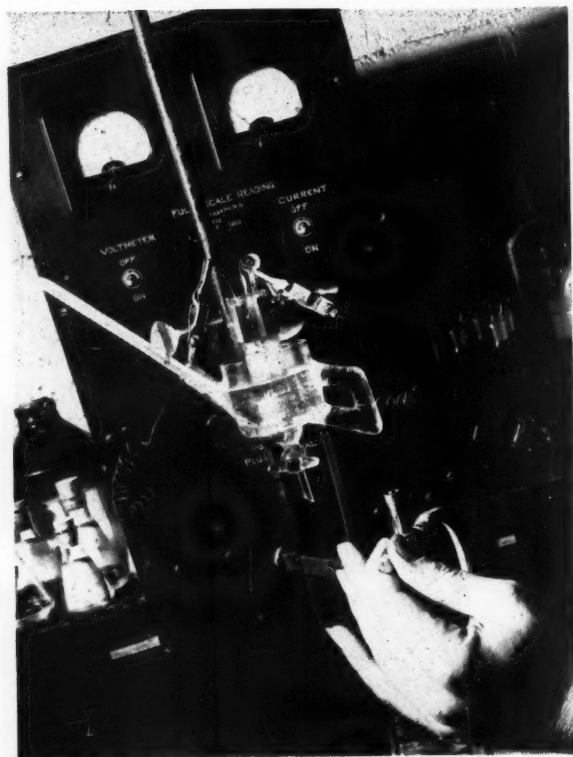
Petrochemicals Ltd. has started up the first cracking furnace at its plant for producing chemicals from petroleum, at Partington, near Manchester, England. The 4½-million-pound plant employs the Catarole process, the first of its kind to be developed anywhere. It enables the production of over 70 different chemicals from the liquids and gases derived from petroleum.

The cracking furnaces convert petroleum-distillate into the full range of aromatic hydrocarbons, formerly obtainable only from coal tar, and into gases rich in olefins. The liquids and gases are processed in subsequent plants to yield finished chemicals.

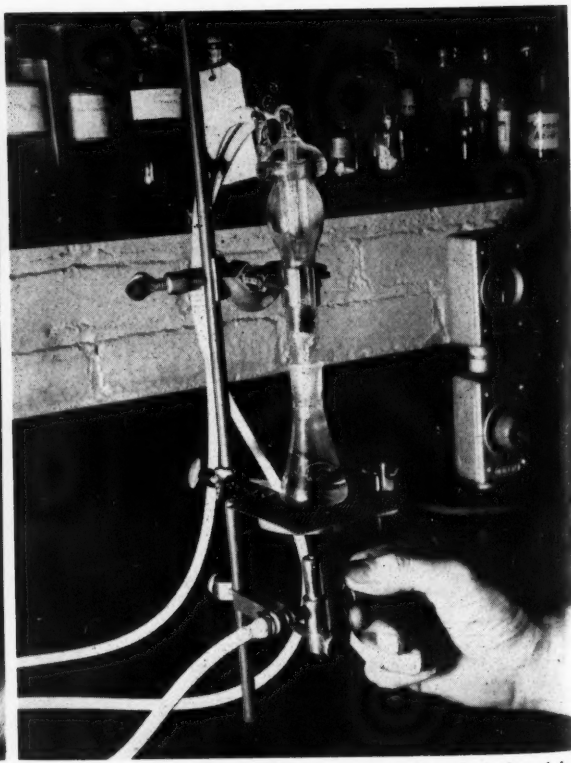
The quality of the products at the Petrochemicals plant has been up to specification and the yield of olefinic gases is higher than expected. Part of the output is being piped direct to the Manchester Corporation Gas Works to blend with the town gas supply. It is estimated that this arrangement will save the Manchester Gas Department a capital expenditure of £250 thousand and about 53 thousand tons of coal per year, which would have been required to produce the additional quantity of gas needed to meet the gas shortage in that area.



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 Isopropyl Ether— $\text{C}_6\text{H}_5\text{OC}_3\text{H}_7$
 Methyl Ethyl Ketone— $\text{CH}_3\text{COC}_2\text{H}_5$

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 Diisobutylene— $\text{CH}_2=\text{C}(\text{CH}_3)\text{CH}_2\text{C}(\text{CH}_3)_2$ †
 Triisobutylene— $\text{CH}_2=\text{C}(\text{CH}_3)\text{CH}_2\text{C}(\text{CH}_3)_2\text{CH}_2\text{C}(\text{CH}_3)_2$ †

† Other isomers also present.

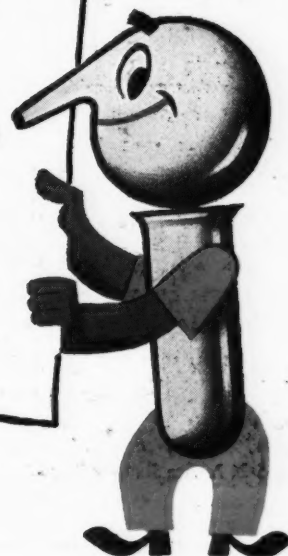
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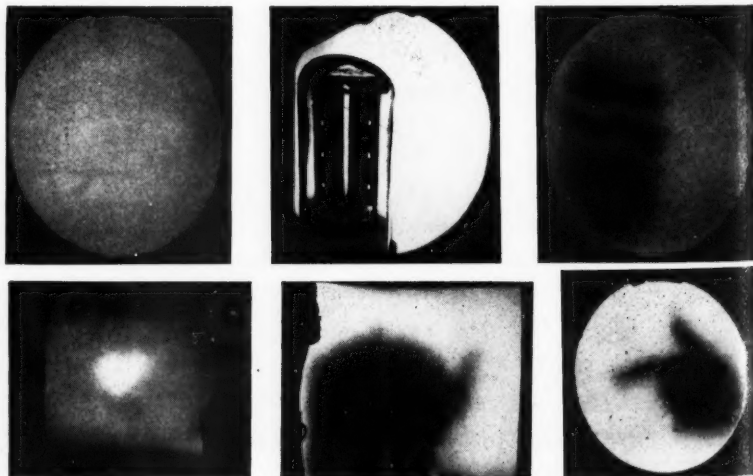
Heat Radiation Pictures



A new method of making heat radiation pictures, called thermo-radiography, has been developed by Eastman Kodak Co. It uses highly sensitive phosphors, which glow in the dark, to record the heat of objects over a wide range of temperature.

Above, the small white square on the heat radiation camera is the phosphor screen where the image appears under ultraviolet light. The curved metal mirror focuses heat radiations onto the screen.

Below, (top left to right) screen excited by ultraviolet light with no image; image of tube by visible light; tube image on screen after filaments have been turned on for some time. Bottom, melting ice against a background of room temperature; tea-kettle of boiling water on a hot plate; and a human hand. The warmth of the hand provided the radiation for the picture; the slight difference in the temperature of the hand compared to that of the air in the room was sufficient to register its image on the phosphor screen.



EASTMAN INDUSTRIAL CHEMICALS

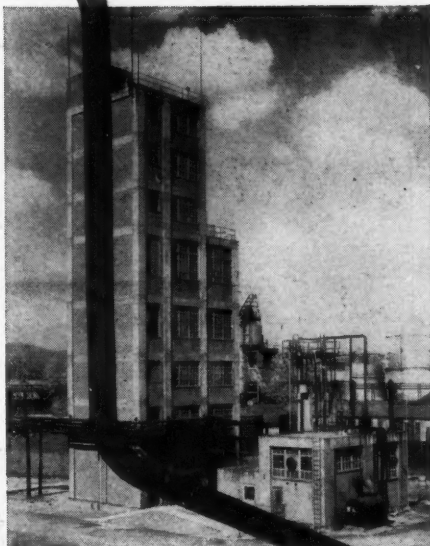
● The chemical industry relies on Eastman Industrial Chemicals for an appreciable percentage of basic organic raw materials. Users are assured of receiving high laboratory quality in commercial quantity, because these materials are produced under vigilantly controlled methods in a modern chemical plant, and are the result of continuous research and development.

In the organic field, Eastman Industrial Chemicals cover aliphatics, aldehydes, acids, anhydrides, esters, and alcohols. In the aromatic series are found anilides, amines, aminophenols, phenols, and phenol ethers. Eastman Industrial Chemicals also include cellulose acetate and cellulose acetate butyrate esters.

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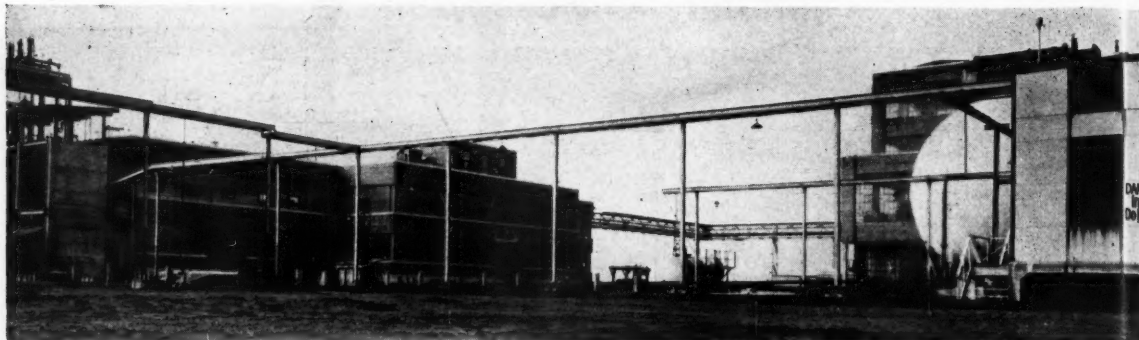


Acetone building in Tennessee Eastman's Acetone Plant



The Tennessee Eastman Corporation plant, Kingsport, Tennessee





Acetylene, generated in the large white building on the right, passes by overhead pipeline to compressors in a reaction bay (far left).

High-Pressure Acetylene Reactions Reach U.S.

EDITORIAL STAFF REPORT

NEW MULTI-MILLION DOLLAR pilot plant of General Aniline and Film Corp. marks the first large-scale study of "Reppe-Chemie" in the U. S.

IN ITS NEW pilot plant at Grasselli, N. J. General Aniline and Film Corp. is introducing high-pressure acetylene chemistry to the American chemical industry. Here compounds are being synthesized from acetylene at pressures (up to 230 psi) and temperatures heretofore considered unsafe.

Acetylene reactions are highly exothermic, and, as Reppe found out in Germany as long ago as 1938, the major problem in controlling them is finding a means to dissipate this energy rapidly. General Aniline accomplishes this in two

ways: either by diluting the acetylene with an inert gas such as propane or natural gas (the Germans used nitrogen), or by reacting it in small-bore equipment so that no empty spaces greater in cross section than 0.25 square inches are permitted.

PILOT PLANT

In addition to its studies of high-pressure acetylene reactions, General Aniline will use the new pilot plant both to improve manufacturing processes of present products (dyestuffs, intermediates, surface-active agents, and textile assistants)

and to test the feasibility of making proposed new products.

For these purposes smaller versions of present plant equipment have been installed, covering most of the unit operations such as drying, filtration, and mixing. Typical of the studies under way is an investigation of possible savings to be made by substituting a continuous rotary filter for a plate and frame press in the production of the company's phthalocyanine dyestuff, Heliogen Blue. Small glass-lined, brick-lined, stainless-steel, and cast-iron versions of plant-scale reactors have been installed for testing existing and proposed reactions.

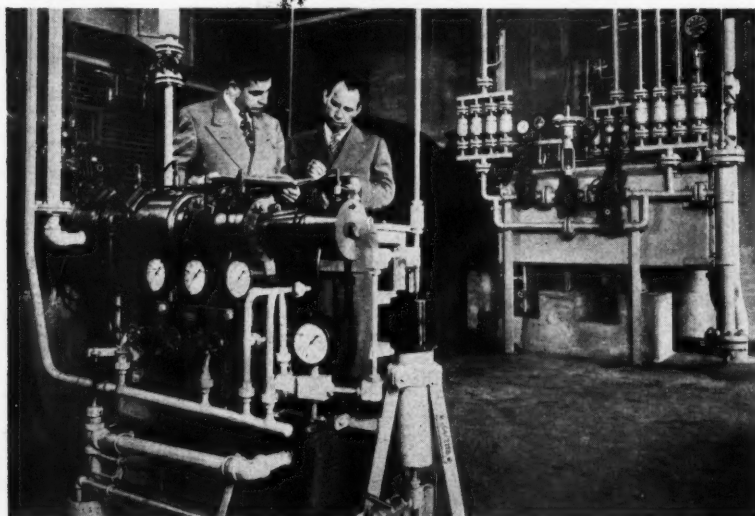
HIGH PRESSURE ACETYLENE

Acetylene (3000 cubic feet per hour) for the pilot plant is produced in standard Linde generators from calcium carbide, which is obtained from the Electro Metallurgical Division of Union Carbide and Carbon Corp. Phosphine and arsine formed from the calcium carbide during the formation of acetylene is removed by ferric chloride. The gas is dried over activated alumina before it passes to the compressor or the water-type gasholder. The gasholder is not generally required except to provide surge capacity for the system. All gas returning to the compressor from the gasholder must again be dried over activated alumina before use.

Two types of compressors are used: One is a slow-speed Norwalk reciprocating machine while the other is a Nash Hytor rotary compressor using water as the internal compression fluid. Maximum pressure reached is about 230 psi.

REACTIONS

Two of the processes discovered by Reppe—vinylation and ethynylation—are in operation in the plant.



Compression of the acetylene takes place in either a slow-speed Norwalk reciprocating compressor (right) or a Nash Hytor centrifugal compressor (not shown). The four-stage compressor (foreground) supplies hydrogen at 6,000 psi to convert butynediol to butanediol.

Zinc Chloride

FOR USE IN—Preserving wood; Finishing paper and textiles; Flameproofing and dyeing textiles; Galvanizing; Manufacturing vulcanized fibre, batteries and glue.

Zinc Sulphate

FOR USE IN—Fertilizers and orchard sprays; dyeing and printing textiles; Electro plating; Electro galvanizing; making rayon, paint, varnish, glue.

At Wheatland, Pa., Maneely Chemical Company has one of the most efficient, modernly equipped chemical plants in the country.

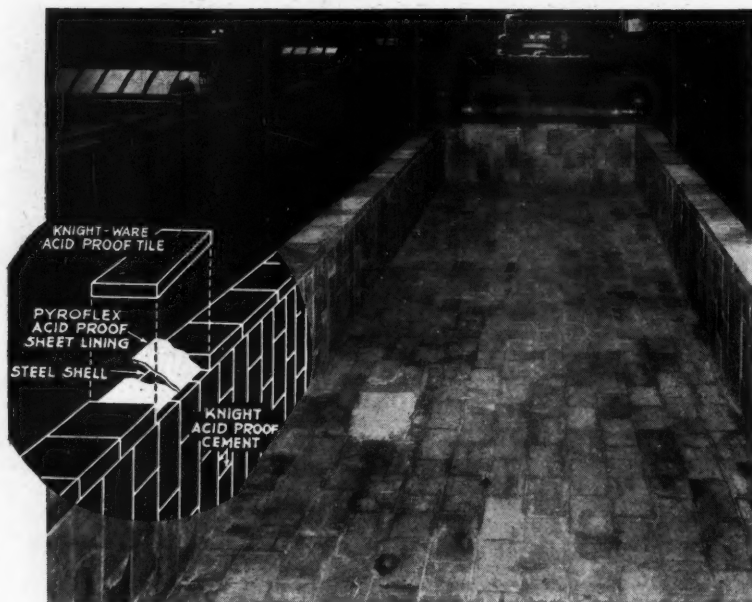
Glass lined vats and equipment and a new process combine to give a new high in uniformity, purity and quality.



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This tank will live to a ripe old age because it is PYROFLEX - Constructed

Pickling tanks lead a tough life. The Pyroflex-Constructed Pickling Tank above is in use in a continuous strip steel line in a large Ohio steel mill. It is subject to constant attack by acids, steam and other corrosive agents. To make this tank completely corrosion proof, Knight engineers specified Pyroflex sheet lining heat bonded to the steel shell, then covered with Knight-Ware Tile set in Permanite acid-proof cement. The result is a tank completely resistant to this highly corrosive type of service.

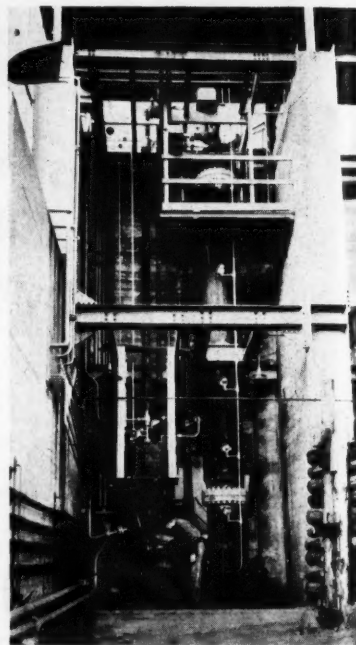
However, Pyroflex Construction is not always composed of these same materials. In designing various corrosion proof constructions such as tanks, chlorinating towers, floors; sewers, fume ducts, etc., Knight engineers may incorporate ceramics, carbon, glass, plastics or any other materials best suited to the individual situation. Consequently Pyroflex-Constructed units live to a ripe old age with less "down time" and lower maintenance costs.

When making inquiry regarding Pyroflex Constructions, please specify type of equipment in which interested, service conditions, involved, etc.

Maurice A. Knight 204 Kelly Ave., Akron 6, Ohio
Acid and Alkali-proof Chemical Equipment

ACETYLENE (Continued)

Vinylation is the introduction of a vinyl group into a molecule by reaction with acetylene. Acetic and hydrochloric acids, for example are being added to acetylene to form vinyl acetate and chloride. These reactions, however, are carried out at very moderate temperatures and pressures. Since acid catalysts are not suitable for the vinylation of alcohols, alkaline catalysts and relatively high tempe-



Reactor for production of butynediol from formaldehyde and acetylene. The reactants enter at the top of the column and pass concurrently downward over a fixed bed of copper acetylide catalyst.

atures and pressures must be used—General Aniline uses potassium hydroxide at 60 psi and 160-167° C. for the production of vinyl methyl ether.

Vinyl methyl ether coming from the reactor is purified by distillation in a series of three rectifying columns. It leaves the first, a 35-plate column, in the overhead stream where it is washed with alkaline water while it is still in the vapor state. It is then condensed before entering the second column (30 plates) where about 1-2% of acetaldehyde is removed. The vinyl methyl ether overhead is condensed and passed to a second 30 plate column in the purification train. At this point pure vinyl methyl ether is removed. As the acetal impurities are discharged from the bottom of the column, an alkaline stabilizing agent is commonly added to vinyl ether monomers to prevent hydrolysis or polymerization during storage.

Possible uses for vinyl methyl ether polymers are in heat-sensitizing rubber

Your Union Multiwall Specialist

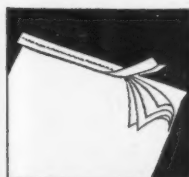
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HOW LONG has it been since an *expert* analyzed your packaging methods?

Recent improvements in packaging methods and materials now make Union Multiwall Bags the preferred packaging for many different commodities . . . over 300 in all. They speed up packaging, cut labor and shipping costs, guard against contamination.

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ACETYLENE

(Continued)

latices, and as a tackifier in adhesive formulations. The polyvinyl butyl ethers are expected to find major application in pressure-sensitive adhesives. The copolymer of maleic anhydride and vinyl isobutyl ether should be useful in preparing "starched" collars and cuffs.

Vinyl methyl ether is the raw material for the first commercial product to issue from the new acetylene pilot plant, dimethyl chloroacetal, which is being shipped in tank car quantities. (This, incidentally, is one of GAF's two products not first produced in Germany, the other malonaldehyde tetraalkyl acetal.) Dimethyl chloroacetal is produced by batch reaction of chlorine, methanol and vinyl methyl ether in the presence of sodium hydroxide at 0° C. Chloroacetaldehyde, formed upon hydrolysis, reacts with thiourea to form 2-aminothiazole, the raw material for sulfathiazole.

ETHNYLATION

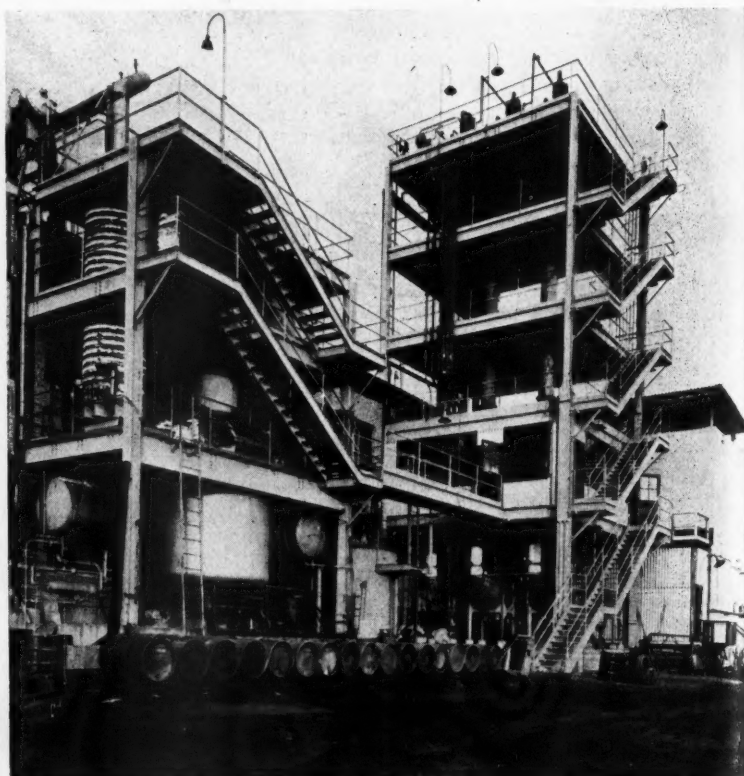
Ethnylation refers to the condensation of acetylene with aldehydes to preserve the triple bond and form such alcohols as propargyl alcohol and butynediol-1,4. In diol formation the reaction is carried out at 90 psi and 95° C. by passing concurrent streams of formaldehyde and acety-

lene downward over a fixed bed of a copper acetylide catalyst which contains bismuth to prevent the formation of cuprene. General Aniline conducts this reaction in the 36-foot-high stainless-steel reactor shown in the illustration.

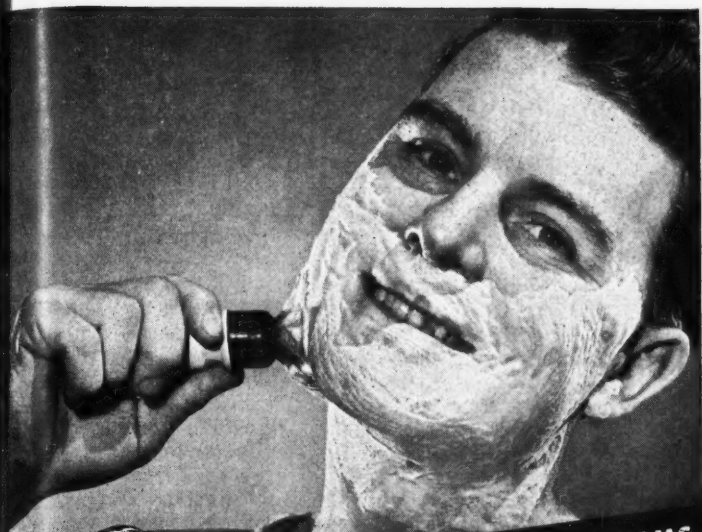
Butynediol is used for the production of the corresponding butanediol by direct hydrogenation over a nickel-copper-manganese catalyst supported on silica gel. A pressure of 4,000 psi and a temperature of 90° C. is utilized to hydrogenate butynediol in aqueous solution. Butanediol is expected to be available in drum quantities within three to six months. Its major use will be in making plasticizers. It also figures as an intermediate for the production of fibers of the Terylene type of polyesters, for the production of isocyanates to be polymerized to polyamides, and for the production of adiponitrile, nylon salt intermediate.

KORESIN

Koresin, a tackifier for synthetic rubber, was developed in Germany and uncovered by the technical investigators at the end of the war. At present it has a limited but sizable demand for certain specialty uses in the fabrication of mechanical rubber goods. Koresin is produced by the reaction of acetylene and *p*-tertiary-butylphenol in the presence of a zinc naphthenate catalyst at a temperature of 230° C. and a pressure of 230 psi.



The three towers used for purification of vinyl ethers are shown on the right and the plant for production of dimethyl chloroacetal from vinyl methyl ether can be seen at the left.



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...TO SULFA DRUGS



*Nothing takes the place
of Glycerine*

To the hundreds of well-established uses of glycerine (shaving cream is just one example), new applications are constantly being added. Among these are many of the preparations in which today's sulfa drugs are administered.

Glycerine's combination of physical and chemical properties can *not* be matched by any other product. Glycerine is a humectant . . . a solvent . . . a suspending agent . . . an emollient . . . a demulcent . . . a lubricant . . . a bodying agent . . . a penetrant . . . an anti-freeze. *And it's edible and wholesome . . . can be applied safely, in proper dilutions, to any part of the body.*

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Technical GLYCERINE NEWS

WANT THE BEST VANISHING CREAM? Recent examination of some hundred formulas for vanishing creams showed that the most successful cream contained the highest percentage of glycerine. (D-1)

★ ★ ★

IMPROVED SUPPOSITORY. A new suppository, claimed to be a firmer and more generally satisfactory product, contains 65 per cent glycerine. (D-2)

★ ★ ★

RELIEF FOR MYCOTIC VULVOVAGINITIS. Treatment of mycotic vulvovaginitis, generally unsatisfactory in the past, may be improved by a new jelly containing calcium propionate, sodium propionate, propionic acid, and glycerine. (D-3)

★ ★ ★

NEW ANTISEPTIC SCALP WASH. Infectious conditions of the scalp are said to be treated effectively by a new wash preparation containing glycerine as an essential ingredient. (D-4)

★ ★ ★

GLYCEROL VISCOSITIES TABLE AVAILABLE. Miner Laboratories, headquarters for the Glycerine Producers' Association program of glycerine research, has prepared a table of viscosities of glycerol in aqueous solution from 0 to 100 per cent, at from 0 to 100 degrees C. You can obtain your copy by merely checking item D-5 on the coupon below. (D-5)

★ ★ ★

NON-SPLASH GLYCERINE DISPENSER. A new spigot glycerine dispenser is claimed to deliver a free and steady flow of liquid without splash or waste. (D-6)

GLYCERINE PRODUCERS' ASSOCIATION, DEPT. 3
295 MADISON AVENUE
NEW YORK 17, N. Y.

I should like to receive more information on the source of the items appearing in *Technical Glycerine News*. I have checked below those items which interest me.

☐ D-1 ☐ D-2 ☐ D-3 ☐ D-4 ☐ D-5 ☐ D-6

NAME.....

COMPANY.....

ADDRESS.....

"... frae monie a blunder free us, and foolish notion"

An Executive Speaks to Research Men

by R. R. COLE

Vice President and Member of the Executive Committee
Monsanto Chemical Co., St. Louis, Mo.

IT IS taken for granted nowadays that research is one of the best investments industry can make.

For one thing, it can, to use the famous lines by Robert Burns, "frae monie a blunder free us, and foolish notion." For the more positive fruits of research we have only to look around us at the tremendous flow of material goods and at our standard of living today. I think research, both academic and applied, can be proud of its share in this accomplishment.

But when we speak of research in this vein we mean productive research. Not all research is, and that is one of the things I want to talk to you about.

To make research most productive in profits as well as in human and social progress is the objective of American industry. On the shoulders of top management rests the heavy responsibility not only for providing funds and facilities but also, and more importantly, for seeing that they are used most efficiently.

This is not altogether a question of the

amount of money spent, the buildings and equipment, or the people employed. It is not only the organization of the research departments and their administration and operation. All these things are important, it is true. But the fruitfulness of research, it seems to me, depends to a large degree on its direction and coordination with the other elements of an industrial enterprise, and of the atmosphere in which research people work.

In a sense research is everybody's job. Just as sales, production and finance are. They are all members of a team which must continually function smoothly if management is to realize its objective. This objective is, generally speaking, the production and sale of products of the highest quality and widest usefulness which will return a fair profit on investments.

Here, it seems to me, we get into the job of the executive. It is his sometimes painful duty to make decisions, to point out turns in the road. He may have an excellent "automobile," well designed, operating efficiently and under control, but where shall it take his company, and at what speed? That the decisions are not

easy may be seen from the number of milk and cracker diets among us, by our concern with our duodenum.

I do not mean to imply that the duties of others are not arduous as well. But it is the executive who must take the unavoidable calculated risks. They stem from the nature of the data he has to base his decisions on. Not your kind of concrete and predictable data, but a welter of sometimes confusing reports and surveys. He has no time to check them. He has no formulas. Nevertheless, patterns do emerge. And the executive acquires helpful rules of thumb and an intuitive ability to weigh the evidence and be right most of the time. That's what he is paid for. If he doesn't have them he gets out.

Put yourselves in the executive's position and ask yourselves how confidently you would proceed in your laboratories if the data you worked with was of this variable and unmeasurable type. Or if it was gathered for you by someone else and you had to use it without checking it. You may say the executive must have confidence in the members of the company team. True. And the good ex-

Based on a paper presented before the Industrial Research Institute, Feb. 2, 1949, at Rye, N. Y.

WHAT A CHEMICAL EXECUTIVE THINKS ABOUT RESEARCH

1. It has done and is doing an amazing job, as attested to by our standard of living and business prosperity.

2. It would be helpful if the research information presented to an executive as a basis for making decisions could be as uncolored and reliable as the experimental and theoretical data behind it.

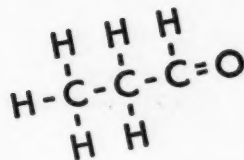
3. Although it sometimes seems impossible, we are making progress both in shortening the process from idea to sales and in predicting the outcome of a particular project and of the consequences of its success on the company and the nation.

4. On one level research may be too successful. Management may have to be pushed to consider long-range ends at the expense of the immediate skimming of scientific knowledge. This is necessary for its long-pull benefits and to attract capable men who want to do more than improve present products or processes.

Perhaps we are so regimenting our research work in a mistaken attempt at efficiency that we are in danger of destroying its sustained fruitfulness.

We must balance long-range and short-range work in our research laboratories so that in peace or war our country will continue to prosper.

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Propionaldehyde, formerly produced in pilot plant quantities, is now on the Celanese list of major chemicals, and available in tank car quantities. With properties midway between acetaldehyde and butyraldehyde, this aldehyde has the typical highly reactive qualities of the aldehyde group. It can be used to enhance the properties of many products wherein other aldehydes are now used.

FORMALDEHYDE • ACETALDEHYDE

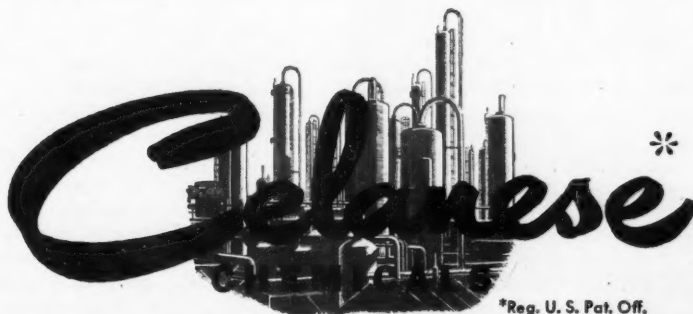
As a large volume producer of important industrial aldehydes, Celanese offers these chemicals in the quantities you need. Formaldehyde—sold commercially as Formalin—is 40% formaldehyde by volume, 37% by weight. It is obtainable

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FROM DU PONT

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1,4-DICHLOROBUTANE is a rarity among organic intermediates—an alpha, omega aliphatic dichloride. The highly reactive chlorine atoms can be replaced by sulfur, cyanogen, amine, alkoxy, aryloxy, and other groups. The following examples illustrate the versatility of 1,4-dichlorobutane and will suggest many other reactions.

1,4 - DICHLOROBUTANE

WITH Sodium Cyanide

→ Delta-chlorovaleronitrile and Adiponitrile

WITH Alcoholates and Phenolates

→ Chloroethers and Diethers

WITH Alkali Metal Salts of Weak Organic Acids

→ Esters of 1,4-Butylene Glycol

WITH Sodium Sulfide

→ Tetrahydrothiophene

WITH Sodium Phthalimide
plus hydrolysis

→ Tetramethylene Diamine

PHYSICAL PROPERTIES

Appearance. Colorless, mobile liquid
Odor.....Mild, pleasant
Molecular Weight.....127.02
Boiling Point....155°C. at 760 mm.
Specific Gravity, 20/4.....1.141
Index of Refraction, N₂₀/D.....1.4542
Flash Point.....125.6°F.
Solubility.....Insoluble in water.
Soluble in most common organic solvents.

AVAILABILITY

1,4-Dichlorobutane is available in ample quantities for research and development purposes. A request on your company letterhead will bring further technical information and also a sample if desired. E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Department, Field Research Section, Wilmington 98, Delaware.



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DU PONT
ELECTROCHEMICALS

FIELD RESEARCH SECTION

RESEARCH APPRAISALS (Continued)

executive prides himself on his knowledge of people. It would help, however, if the team members realize that what is obvious to them may not be to the man making the decision. I ought to say, on the other hand, that they in turn should be shown the courtesy and have the benefit of a detailed veto message in the case of a negative decision.

What does all this have to do with research and development? Simply this. I wish that all research and development people were as matter of fact and passionless in their presentation of facts as they are in obtaining them. I am sure many of us sometimes feel that all the evidence is not in. We have an uncomfortable feeling of being pushed out on a limb. And all manner of combinations occur, as sales, production, research and finance oppose or support one another. The result may be a blind alley, a course of action which wastes time and money.

So you see, as applies to research, what the executive dreams of is the sure thing, whether a new product, a new application or improved products and processes. I wish, for example, that it did not require as much time as it usually does to bring a product from the idea or experimental stage to production and sales. If the conveyor belt could be shortened we could more quickly cut short any development which seemed futile, or change our direction. But, you are making progress in this direction.

Cost, marketing, engineering and finance considerations are being taken up earlier and earlier in the process. The pilot plant, except as a source of sales development quantities, may be eliminated altogether, as it sometimes is now. Still, it is extremely difficult to prepare a profit and loss statement for research. I wish we could say, for example, that project "x 49" cost in research \$335,000 and shows a profit of \$654,000 during the first three years of operation.

Some day, perhaps, we may have a marvelous touchstone formula in which are combined all the variables, economic and human, of producing and marketing a product or process. This expression, the $E = mc^2$ of business, would be a balm to the executive. But the variables are unwieldy, and I am afraid no mathematics will be so satisfying. The calculated risks will remain. Indeed, without them we would not have the vital economy and society we do have. In this country risks are taken and enterprises entered upon from millions of centers and are matched one against the other with a total gain for the nation. This brings me to another point which I want to make at the risk of seeming inconsistent.

On one level research may already be too successful. Thanks to the efforts of

many, our research is streamlined, efficient and approaching a condition where it is almost possible to predict what the returns will be from a given amount of expenditure. Even though research, as any other human activity, is subject to waste and misdirection, perhaps we have taken the easy way too often and sacrificed the long-range ends for more immediate and profitable ones. How much money and manpower, in short, should be assigned to the improvement of present products or processes and the discovery of new ones, and how much to fundamental or so-called pure research?

In a recent statement William M. Rand, the president of my company, had this to say, "Carried too far, the search for near-term profits may endanger the long-term profitability of a company... If we should curtail promising research and development programs now, we may be haunted later by lost opportunities and find ourselves rushing to completion the badly needed new facilities at the end of the business cycle."

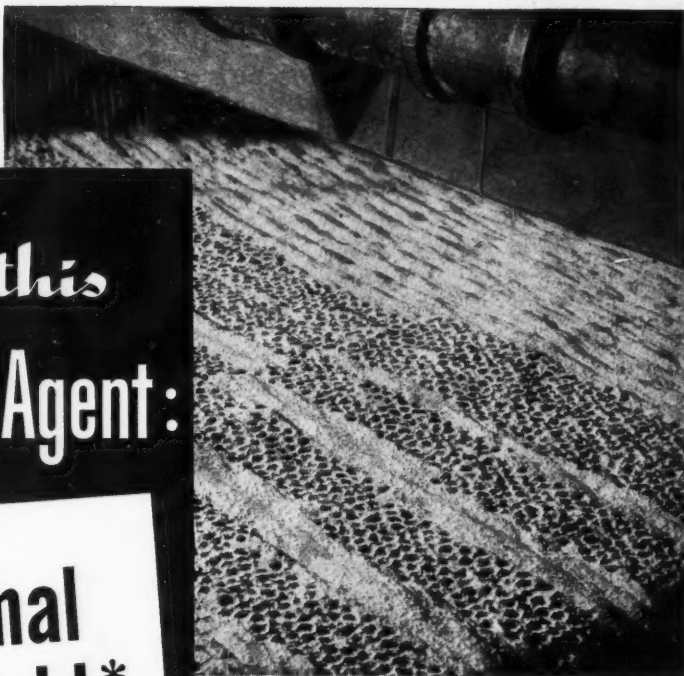
We may be sacrificing the basic and underlying exploratory work of which our applied research are only efflorescences. We must strike a balance between long-range and short-range work. We must fertilize the soil as we till it. And to pursue this analogy, perhaps it would be worthwhile, not to say profitable, to allow qualified men to remain fallow for certain periods of time. The point is that basic and applied research are as interrelated as good soil and plentiful crops. "The deserved success of research," says George O. Curme, Jr., "in industrial fields has come principally from the work of those scientists who have translated the perseverance, inspiration and intellectual honesty of academic, scientific research to the field of practical affairs."

How much of a budget ought to be spent in this kind of basic, long-range gambling? Again, there is no formula. I would say in the neighborhood of 20%, perhaps less in some cases. But this is a matter for you research people to decide. It concerns your future well being. I would suggest that you push your managements to make decisions on this question. In spite of what I have said about being out on a limb, I think they would be grateful.

Of course, a balance of some kind must be struck. We cannot afford the luxury of whimsical, unworkable or bizarre inquiry. In some ways this is being worked out. We have close liaison with the work in universities and colleges. Indeed, much academic basic research is sponsored by companies who cannot afford to do it themselves.

The need is there. Some problems we have only isolated in a strategy compar-

Shown here is one view in the spotless modern plant where Swift's Animal Protein Colloid is made. Operation is continuous, automatic... the product is "untouched by human hands," not contaminated by foreign substances.



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Swift's Animal Protein Colloid*

(made from an exclusive
Swift Process)

*Does your manufacturing process
require . . .*

1. An emulsifier?
2. A flotation agent?
3. A gel structure?
4. A settling agent?
5. A protective coating?
6. A sizing agent?
7. A carrier of pigments?
8. An impregnating agent?
9. A base for pigment?
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13. A filtering agent?
14. A stiffening agent?
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This modern process agent, Swift's refined Animal Protein Colloid, has properties which may be employed in a wide number of processes. Even though you have used other processing agents, be sure you investigate Swift's Animal Protein Colloid now. It has unusual properties. It may meet the requirements of your present operations or help in developing new ones.

What is this modern process agent?

Swift's Animal Protein Colloid is made by an exclusive Swift process. Protein liquor is extracted from bones and highly concentrated. This pure liquid falls on a bed of dry finished product which adheres evenly to the droplets. Then, by continuous and automatic schedule, these droplets travel through driers and are milled and screened. This whole operation is under *precise synchronized control* and is completed in relatively short time.

The result is a uniform granular form that goes into solution rapidly. It's a purified product, light amber in color.

Because plant and machinery are kept spotlessly clean—the finished product does not touch material which can contaminate it with foreign substances... because of the precise control possible with Swift's exclusive process, Swift can bring you this *superior* processing agent. And Swift's Animal Protein Colloid has the same high quality and uniform characteristics the year 'round.

Swift's technical service yours, investigate now

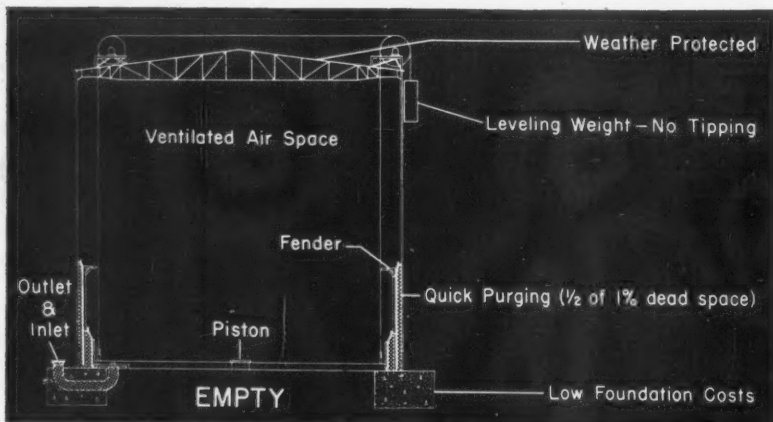
Write or phone for one of Swift's special representatives. He will call and discuss Swift's Animal Protein Colloid with you. This process agent may be just what you are looking for. Write to:

Swift & Company

ADHESIVE PRODUCTS DEPARTMENT

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*Commercially high quality bone glue.



WIGGINS GASHOLDER

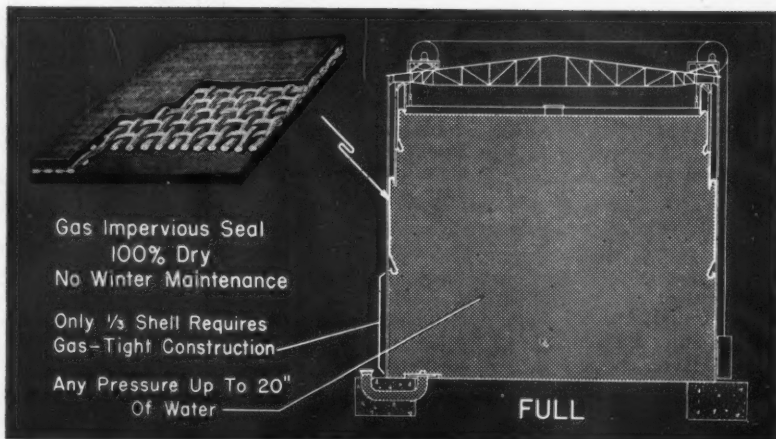
Designed and built to store chemical process gases such as

CO₂, CO, H₂, N, CH₄

**NO OPERATING EXPENSE
PRACTICALLY NO MAINTENANCE
BECAUSE**

IT IS THE ONLY GASHOLDER WHICH

- 1: HAS AN ABSOLUTELY DRY FRICTIONLESS SEAL
- 2: IS NOT AFFECTED BY HEAT, COLD, ICE, SNOW, WIND OR RAIN
- 3: DOES NOT ADULTERATE THE GAS
- 4: HAS LESS THAN 1/2 OF 1% DEAD SPACE FOR QUICK PURGING



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RESEARCH APPRAISAL

(Continued)

able to that used in the last war. We have left areas to which we have had to come back later to mop up. There may be too many such areas still existing in industry. Several examples come to mind in my industry.

We have many products and processes of which little is known about the underlying science. Phenol formaldehyde resin is a thermo-setting resin which has been in use for over forty-five years, yet we bypassed questions about the basic chemistry of its formation. There are others, such as penicillin, Buna rubber and many catalytic reactions. We have been getting along all right. But we might have taken a radically different course, a much simpler one, if we had known the why of these reactions. Perhaps the fact that we have and do by-pass such areas is management's fault. As I mentioned earlier, the atmosphere of most industrial laboratories, with their projects and schedules may not be conducive to this kind of more leisurely, less obvious and more imaginative inquiry. In research, as in society at large, an excess of control and regimentation can result in plodding, ossified and stunted work. More than anything else, science—restless and curious—needs the freedom to postulate new and daring hypotheses. In my opinion it epitomizes the imaginative way in which man has adjusted himself and his environment to his needs.

I want to suggest then that in our efforts for efficiency we do not achieve a regimentation as enervating as that which has afflicted so many nations in recent history. It would be particularly serious in this area which is in effect the well-spring out of which our material progress flows. We must encourage the restless, versatile and self-reliant spirit of the frontier, which today is that of the scientific adventurer. He ranges the whole field of knowledge. He is often scoffed at, often alone, but always exploring the unknown expanses of that great country whose boundaries have not yet been reached.

It is clear that at the present stage of industrial research only the objectives separate the theorists and "practical" men. You are members of the same societies and read the same journals. This merging has made you both stronger. But you will need your strength.

We have committed ourselves to help so many peoples of the world, so much of it depends on us, that we must continue to produce an ever increasing amount of goods and services. Whether the threat of war materializes may depend on how well we meet this task. And if war should come in spite of our best efforts, the nation would once again look to us for its materials of war.



Potassium Metabisulfite Crystals

Chemical users throughout the nation know Mallinckrodt sulfites for their uniform dependable purity.

Mallinckrodt Sulfites

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Permanent wave solutions

Calcium Sulfite



Food bleach and preservative

Potassium Metabisulfite
Sodium Metabisulfite



Antiseptics in brewing and wine-making; sterilization of plant equipment, barrels and kegs; photography

Sodium Sulfite



Photography; permanen. wave solutions

SULFITES

	FORMULA	TYPICAL ASSAYS*	CALCULATED SO ₂ EQUIVALENT	FORM	SOLUBILITY in parts per 100 of water at room temperature
AMMONIUM SULFITE	(NH ₄) ₂ SO ₃ + H ₂ O	94% as (NH ₄) ₂ SO ₃ + H ₂ O	~47%	Small Granules	67
CALCIUM SULFITE	CaSO ₃ + 1 1/2 H ₂ O	94% as CaSO ₃ + 1 1/2 H ₂ O	43%	Crystalline Powder	0.004
POTASSIUM SULFITE	K ₂ SO ₃	94% as K ₂ SO ₃	40%	Coarse Crystalline Powder	100
POTASSIUM METABISULFITE	K ₂ S ₂ O ₅	97% as K ₂ S ₂ O ₅	59%	Granules or Powdered	49
SODIUM SULFITE	Na ₂ SO ₃	94% as Na ₂ SO ₃	50%	Small Granular Fine and Powder	20
SODIUM METABISULFITE	Na ₂ S ₂ O ₅	99% as Na ₂ S ₂ O ₅	61%	Granular or Powdered	67

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Mallinckrodt Chemical Works



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*These figures are determined at the time of manufacture. Over long storage periods changes may be expected since some of these chemicals have a strong affinity for oxygen.

NEW PRODUCTS & PROCESSES

Sodium Tungstate NP 878

Four grades for uses ranging from medicinal to technical—textile dyes and printing inks—are supplied in bulk.

High-purity sodium tungstate for use in medicines, radiology, dyes, inks and other specific industrial and process uses are now offered by the Tungsten & Chemical Division of Sylvania Electric Products, Inc. These white crystalline water soluble products are supplied in four grades ranging from highest-purity Folin Grade, required for medical solutions, to high-purity commercial grades for textile dyes and printing inks.

Four grades are supplied in 350-lb. drums. Composition of the Folin Grade is as follows. Two others are less pure, and the last is anhydrous.

Maximum Impurity Limits

	%
Alkalinity (as Na_2CO_3)	0.20
Alkalinity (as NaOH)	0.15
Chloride (Cl)	0.005
Insoluble Matter	0.01
Heavy Metals (as Fe)	0.0005
Other Heavy Metals (as Pb)	0.0005
Molybdenum (Mo)	0.0009
Nitrogen Compounds	0.001
Sulfate (SO_4)	0.005
Water	12.0

Iron Sequestrant NP 879

New sequestering agent is particularly designed for removing ferric iron, also effective for alkaline earths.

Bersworth Chemical Co. has developed a new sequestering agent called Versene Fe-3, particularly effective in sequestering the trivalent iron that often exists as a chemical contaminant in solutions. The sequestering power of Versene Fe-3 for

calcium and magnesium at a high pH is almost as great as the sequestering power of regular Versene.

A Versene Fe-3 solution containing sequestered (i.e., non-ionic) ferric iron also has considerable sequestering action on calcium and magnesium. As an example, 10 cc. of Versene Fe-3 sequesters 167 mg. of ferric iron as well as 158 mg. of calcium at a pH of 7.

Versene Fe-3 is about twice as effective as regular Versene in sequestering trivalent iron at pH 12 and about three times as effective at pH 7.

Trivalent iron in water and other aqueous solutions often causes trouble in the preparation of soaps, fats, oils, emulsions, sanitizing agents, drugs, food products, textiles and metal processing. Therefore, the new material should prove of intense interest to manufacturing and experimental chemists.

Isovaleraldehyde NP 880

Now commercially produced, isovaleraldehyde offers isoprene skeleton, reactive end group.

Isovaleraldehyde, which for many years has been available only in pilot-plant quantities, is now in commercial production by Millmaster Chemical Co.

Isovaleraldehyde ($\text{C}_5\text{H}_{10}\text{O}$) has many suggested uses in the manufacture of pharmaceuticals, synthetic resins, and as a rubber accelerator. As a starting compound in organic synthesis, this aldehyde has the isoprene carbon chain with a reactive end group. It is suggested as a possible starting point for vitamin A synthesis.

Fluorine Compound NP 881

Hooker producing 2-chloro-5-nitrobenzotrifluoride in pilot plant.

A new fluorine-containing hydrocarbon is in limited pilot-plant production at the Hooker Electrochemical Co. The product, 2-chloro-5-nitrobenzotrifluoride, will be of particular interest in the preparation of dyestuffs and intermediates. The compound is a straw-colored, thin, oily liquid with a specific gravity at 25° C. of 1.5520. Its freezing point is 16.8° C., boiling point is 230° C., and its flash point is 135° C.

Brominating Agent NP 882

Solid, stable brominating agent permits precise weighing of added bromine.

Pyridinium bromide perbromide, a solid brominating agent containing 45 to 50 per cent bromine, is available from Jasons Drug Co. The compound is a red solid melting at 135° to 137° C. and is stable in the dry state. Its advantage lies in the possibility of precisely weighing predetermined amounts of the compound—a procedure more difficult with dangerous elemental bromine.

Mono- or polybromination of ketones, including aliphatic, alicyclic, aralkyl, and amino ketones may be performed in acetic acid, ethanol, and other nonaqueous solvents with high yields and recoveries.

Dimethyl Chloroacetal NP 883

Commercial quantities of technical dimethyl chloroacetal are now available.

Technical dimethyl chloroacetal, at prices ranging from 51¢ to 65¢ per lb. depending on quantity, is now available from General Aniline & Film Corp.

Slightly heavier than water and boiling at 126°-132° C., the material is a versatile bifunctional reagent. It can react either as an alkyl halide or an aldehyde, or both, depending upon the pH of the reaction medium and the conditions employed.

In alkaline media, the acetal group is stable and dimethyl chloroacetal reacts essentially as an alkyl halide with a variety of amines, alcoholates, phenolates, mercaptides, active methylene compounds, etc., to give acetal derivatives.

In acidic media, dimethyl chloroacetal is hydrolyzed and becomes a convenient source of chloroacetaldehyde. Under these conditions, both the labile chlorine and the aldehyde group can react to give a large group of interesting products.

If bifunctional compounds are reacted with dimethyl chloroacetal, cyclic products can be produced.

Like many acetals, dimethyl chloroacetal will slowly form peroxides when exposed to air and light. The technical acetal contains 0.1 to 0.2% triethanolamine as a stabilizer to retard this peroxide for-

CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

CHEMICAL INDUSTRIES, 309 W. Jackson Blvd., Chicago 6, Ill. (4-9)

Please send me more information, if available, on the following items. I understand that nothing further may be available on some of them.

NP878	NP882	NP886	NP890
NP879	NP883	NP887	NP891
NP880	NP884	NP888	NP892
NP881	NP885	NP889	NP893

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profitable reading for research chemists



Table of Contents includes:

Sources of Fatty Acids . . . Chemical Composition of Fatty Acids . . . Saturated Fatty Acids . . . Unsaturated Fatty Acids . . . Unusual Types of Fatty Acids . . . Fatty Acids Synthesized from Natural Acids . . . Isomerism.

General Reactions of Fatty Acids . . . Reactions Involving the Double Bonds . . . Oxidation . . . Polymerization . . . Hydrogenation . . . Halogenation . . . Sulfonation and Sulfation . . . Reactions Involving the Carboxyl Group.

Soaps or Salts of Fatty Acids . . . Acyl Halides . . . Esters . . . Acid Anhydrides . . . Ketenes . . . Ketones . . . Aldehydes . . . Alcohols . . . Amides . . . Nitriles . . . Amines.

Plus an extensive bibliography of technical references relating to the fatty acids.

ARMOUR

Chemical Division

Armour and Company • 1353 West 31st Street • Chicago 9, Illinois



and it's available free!

To help research chemists in their work with fatty acids, Armour and Company offers this informative 12-page technical bulletin, "The Chemistry of Fatty Acids," describing the fatty acids, their compositions, reactions and derivatives. See Table of Contents below.

To date, the fatty acids have found wide commercial use in fields ranging from chemicals to cosmetics, inks to insecticides, leather to lubricating greases, paper to protective coatings, plastics and synthetic resins to putties and caulking compounds, as well as in ore flotation, rubber compounding, edible products, metallic soaps, buffing compounds, soaps and synthetic detergents, textile processing chemicals, waxes and polishes, etc. But fatty acids and their compounds offer chemists an almost unlimited range of chemical and physical properties from which to choose. That's why research chemists are continually discovering new commercial applications for the fatty acids.

Thanks to expanding production, Armour can now offer prompt shipment of the most complete line of fatty acids available—many at pre-war prices. Quotations, samples, and technical information are available upon request.

**WRITE TODAY for the free booklet,
"The Chemistry of Fatty Acids"**

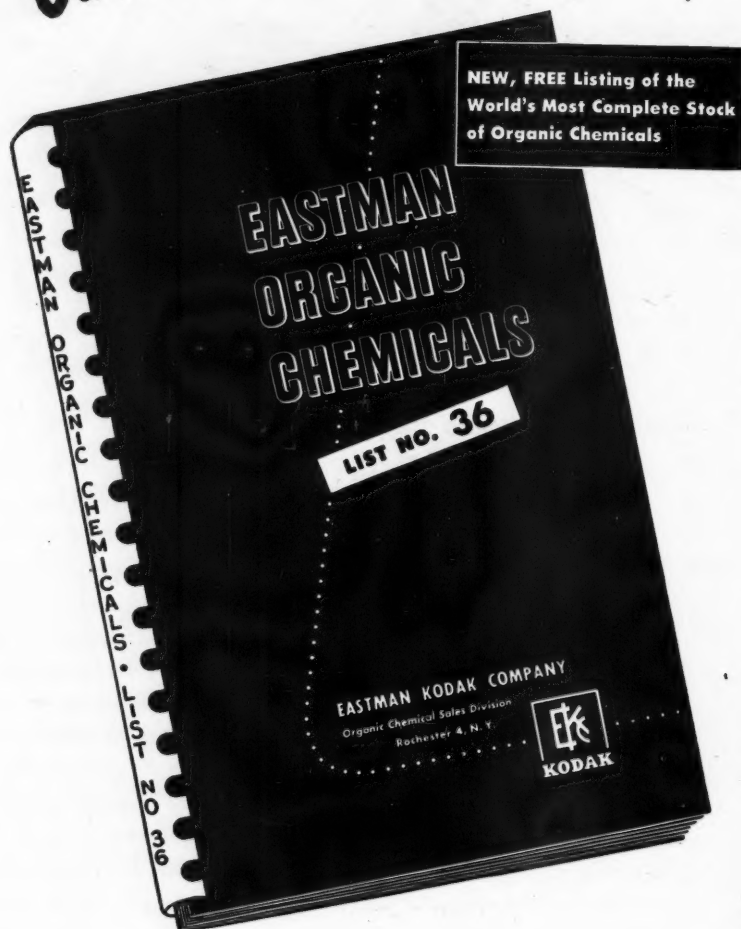
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Firm Name.....

Address.....

City.....Zone.....State.....

Just off the Press!



Every Laboratory...in every division of chemistry that works with organics...needs a copy of this important reference book. It gives structural formulas, melting or boiling ranges, and prices for the great stock that serves chemists everywhere as a single, completely dependable source of research materials.

If you have not yet received your copy of "Eastman Organic Chemicals, List No. 36," please write.



EASTMAN KODAK COMPANY
Organic Chemical Sales Division
Rochester 4, N. Y.

THERE ARE SOME

3000

EASTMAN ORGANIC CHEMICALS

mation and to prevent the corrosion of metal containers.

Technical dimethyl chloroacetal may be purified by drying over an alkaline drying agent such as anhydrous sodium or potassium carbonate, etc., followed by fractional distillation to remove the stabilizer.

When it is necessary to store purified dimethyl chloroacetal containing no stabilizer, amber glass containers should be used and contact with air held to a minimum. It is recommended that a test be made for the presence of peroxides before distilling acetal that has been stored for some time.

Furfuryl Mercaptan NP884

An essential constituent of roasted coffee aroma is potentially useful in flavors, perfumes, and organic synthesis.

Furfuryl mercaptan is now available commercially from Cargille Scientific, Inc.

Sold under the trade name Coffee-Captan, the material offers interesting possibilities in perfumes and flavors, where its high dilution factor brings the cost to a reasonable level. It is also of potential interest in organic synthesis, as a polymerization agent, and as an intermediate for rubber accelerators.

Reduction in present prices (e.g., \$235 per kg.) is predicated upon larger production as applications develop.

Fast-Drying Alkyd NP885

Oxidizing-type alkyd gives enamels that dry quickly at low temperatures.

A new oxidizing type phthalic alkyd resin is said to offer the manufacturer of automotive refinishing enamels and similar coatings the advantages of fast-drying speed, excellent color, high gloss and great durability.

The new resin, designated as Duraplex C-55, is manufactured by Rohm & Haas Co., and is designed to meet the stringent requirements demanded of paint vehicles in the countless body repair shops, paint shops and garages where winter temperatures often fall below the optimum. Enamels formulated with this resin are applicable also to fast-drying uses of farm implements, gasoline pumps, metal signs and other surfaces requiring repainting.

Air-drying enamels using the new resin will set to touch in about 15 minutes, show only very slight tack after six hours, and, where two-color work is necessary, tape well after an overnight dry, even at low temperatures. This fast-drying property, naturally, gives maximum freedom from dirt collection.

In baking-type coatings Duraplex C-55 is said to be much faster curing than conventional alkyds. It has been found to provide remarkable hardness when

FROM SHELL CHEMICAL . . . in commercial quantities

TERTIARY BUTYL ALCOHOL

CH₃
|
CH₃-C-OH
|
CH₃

**A high-purity alcohol
completely miscible with water**

SPECIFICATIONS

Purity	Minimum 99% by wt.
Spec. Grav. 20/26°C	.781—.784
Color	Max. 10 plat. cobalt (Hazen) standard
Water	Miscible without turbidity with 19 vols. of 60° B _e gasoline at 20°C
Acidity (other than carbon dioxide)	Maximum 0.003% as acetic acid
Distillation range	Below 81.5°C—None Above 83°C—None
Freezing Point (first needle)	Above 24°C
Non-volatile matter	Max. 2 mg per 100 ml

Among the many other products manufactured by Shell Chemical are Acetone, Mesityl Oxide, Allyl Alcohol, Methallyl Alcohol and Epichlorohydrin

Consider the advantage of using high-purity TBA in your formulations:

AS A SOLVENT it is the most stable of all water-miscible alcohols toward oxidizing agents. It is miscible with most organic solvents such as ketones, alcohols, esters, ethers and aromatic and aliphatic hydrocarbons. TBA is used in compounding industrial cleaning preparations and as a denaturant for ethyl alcohol. Suggested applications include its use as an extraction and recrystallization solvent and in surface coatings where its high latent solvent power for cellulose acetate is an advantage.

AS AN INTERMEDIATE it finds application as an alkylating agent for introducing the tertiary butyl group into a variety of compounds useful in the manufacture of resins, pharmaceuticals and perfumes. Manufacturers of dyestuffs, flavoring extracts, insecticides, germicides and fungicides should also find Tertiary Butyl Alcohol a useful chemical raw material.

After evaluating this compound, you may find it a chemical suited to your most exacting requirements.

Bulletin SC: 49-2 and other detailed information on Tertiary Butyl Alcohol, requested on your business letterhead, will be forwarded promptly.

SHELL CHEMICAL CORPORATION

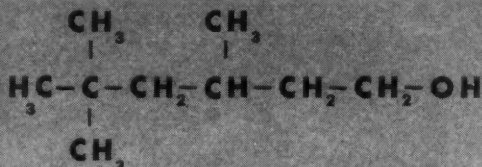
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NEW-from DU PONT



3, 5, 5-TRIMETHYLHEXANOL

A high purity NONYL ALCOHOL ISOMER

Now available commercially

Suggested Uses

Of special interest in plasticizers! 3, 5, 5-trimethylhexanol offers other possibilities as:

An intermediate in the preparation of:

Lubricating oil additives
Ester type synthetic lubricants
Surface active agents
Modified alkyd resins
Disinfectants and germicides

A solvent in the formulation of lacquers and other finishing compositions.

Physical Properties:

Molecular Weight	144.25	
Boiling Point, 10 mm	83° C	(181° F)
760 mm	194° C	(381° F)
Specific Gravity 25°C/4°C	0.8236	
Weight per gallon at 25°C (77°F)	6.86 lbs.	
Refractive Index, n_D^{25}	1.4300	
Flash Point (Open Cup)	200° F	

Chemical Properties:

3, 5, 5-trimethylhexanol undergoes reactions such as esterification, sulfation, dehydrogenation and reaction with phosphorus pentasulfide. Its branch-chained structure affords improved solubility and compatibility.

AMMONIA DEPARTMENT

E. I. du Pont de Nemours & Co. (Inc.)
Wilmington 98, Delaware



BETTER THINGS FOR BETTER LIVING
... THROUGH CHEMISTRY

Ammonia Department
E. I. du Pont de Nemours & Co. (Inc.)
Wilmington 98, Del.
Please send me a sample and data on 3, 5, 5-trimethylhexanol.

Name _____

Firm _____

Address _____

used as the sole vehicle in a white enamel baked for 30 minutes at 300°F. Excellent color and gloss retention are claimed for both air-dried and baked films.

Physical Constants

Solids	50% ± 2
Solvent	Mineral spirits
Viscosity (40% solids)	W — Y
Acid number	4 — 8
Weight per gallon	7.6 lb.
Color (Gardner)	4 — 7
Phthalic anhydride content (solids)	32%
Type oil	Castor

Duraplex C-55 can be reduced with aliphatic naphtha such as mineral spirits and V.M.&P. naphtha. It can be reduced also, of course, with aromatic hydrocarbons, chlorinated solvents, and esters and ketones.

Insecticide Dust

NP 886

Piperonyl cyclonene-pyrethrum-rotenone dust base controls wide range of insects.

A new dust base, which controls a wide range of insects attacking truck crops, and vegetable and flower gardens, but leaves no harmful toxic residues to such vegetation, is offered by U. S. Industrial Chemicals, Inc.

Extensive field tests in 15 states over a period of five years demonstrated that insecticides made from the material, known as CPR Dust Base, offer the advantages of effectiveness, safety, economy and convenience.

The dust base is a combination of piperonyl cyclonene with pyrethrins and rotenone, so formulated as to obtain maximum effectiveness of the potent ingredients. It has been found that by including pyrethrins in the combination its effectiveness is increased between two and three times.

The company revealed that the dust base, now being made available to insecticide manufacturers, is offered in a uniform blend of the active insecticide ingredients so that its mixture with diluents and fungicides presents no problems to the manufacturers.

Control of both chewing and sucking insects which damage garden crops is possible with insecticides manufactured with the dust base, field tests have shown.

Organics

NP 887

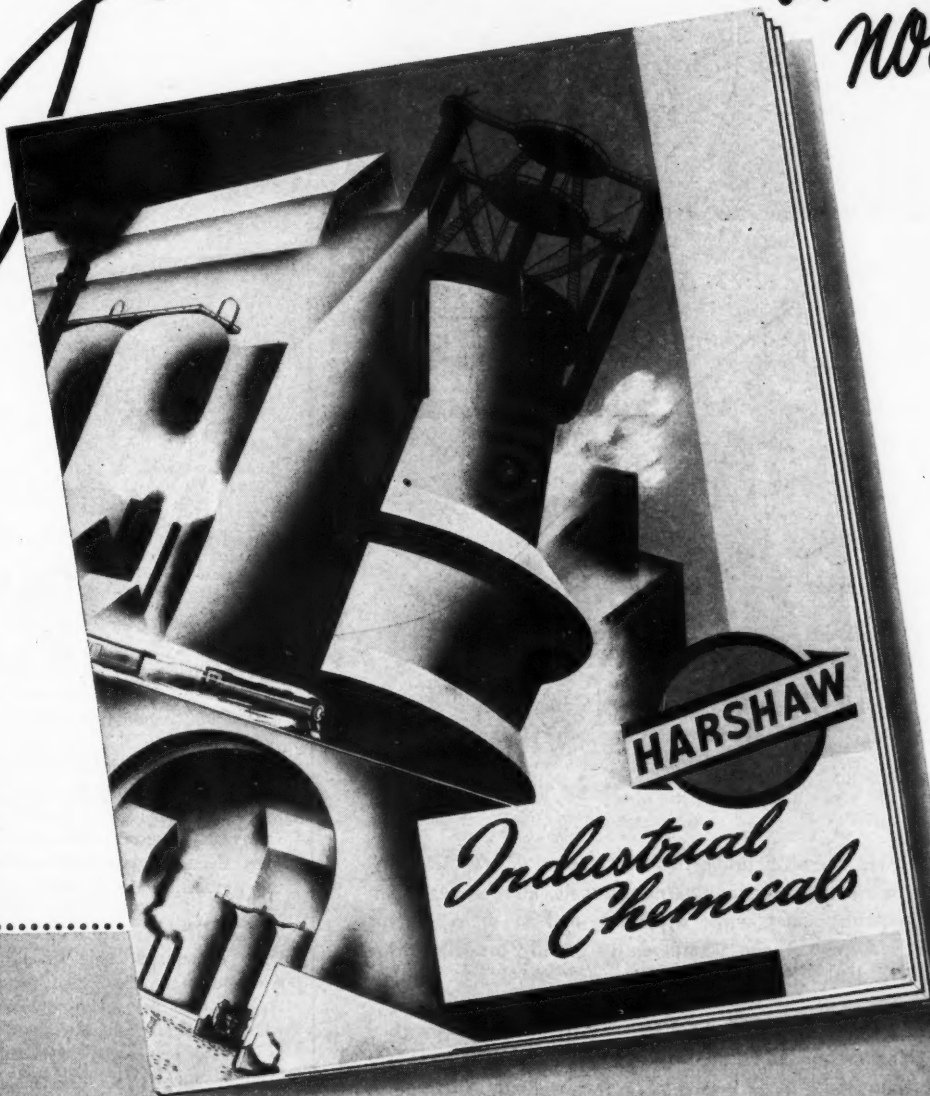
Arapahoe Chemicals, Inc., expands its line of synthetic organic chemicals.

Arapahoe Chemicals, Inc., has expanded its line of cyclopentane derivatives to include cyclopentanol and cyclopentyl bromide in addition to cyclopentanone and its oxime. Since it was first introduced by Arapahoe in 1947, cyclopentanone has attracted considerable interest in the pharmaceutical and perfume industries as an intermediate. The introduction of the new derivatives responds to a demand for "one step further" in a number of synthetic processes. These compounds are avail-

Yours

FOR THE ASKING...

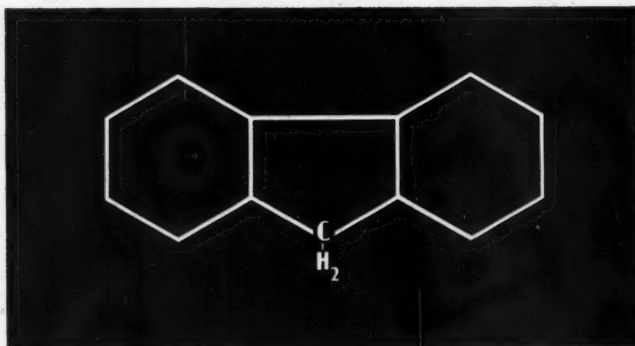
*write
now!*



This 32-page book alphabetically lists all chemicals available through Harshaw, relates the history of the Company and describes Harshaw's major activities. Write for a copy.

THE HARSHAW CHEMICAL CO.
1945 East 97th Street, Cleveland 6, Ohio.
BRANCHES IN PRINCIPAL CITIES

Reilly FLUORENE



OXIDATION



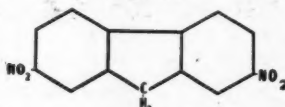
FLUORENONE

SODIUM



SODIUM FLUORYL

NITRATION



2, 7-DINITROFLUORENE

ACETYLATION



2-ACETYLFLUORENE

NITRATION



2-NITROFLUORENE

NITRATION



2, 5-DINITROFLUORENE

The unusual chemical properties of Fluorene warrant its consideration in the synthesis of pharmaceuticals, insecticides, plant growth-regulating compounds, dyestuffs, and in many organic syntheses. A few of the intermediates readily prepared from Fluorene are depicted above.

Reilly Fluorene is furnished in 98% minimum purity, with a boiling point of approximately 295° C and a freezing point of not less than 113.0° C. Insoluble in water, Reilly Fluorene is soluble in hot alcohols, ketones, esters, ethers, aromatic hydrocarbons and many aliphatic hydrocarbons, and in pyridine bases.

Reilly Tar & Chemical Corporation

Merchants Bank Building • Indianapolis 4, Indiana

500 Fifth Ave., New York 18 • 2513 S. Damen Ave., Chicago 8

able from stock in carboy lots and drum lots can be made to order.

The same firm is now engaged in semi-commercial production of oxamide, (CO-NH₂)₂, a white crystalline powder of extremely high melting point. Since its melting point, 419° C., is the highest known for a simple organic compound, oxamide should be of special interest in the fields of flame-proofing, wood treating, etc. Oxamide also offers a stable, anhydrous derivative of oxalic acid for organic synthesis.

Lead tetra-acetate, a specific reagent for splitting glycols into two molecules of aldehyde, first announced by Arapahoe in December, 1947, is now available in moderate commercial quantities.

In addition to splitting glycols, the reagent also ruptures alpha-hydroxy acids, alpha-amino acids, 1,2-amino alcohols, and 1,2-diamines in analogous fashion. A less known reaction of lead tetra-acetate is the introduction of the acetoxyl group (CH₃COO—) into olefins and certain compounds which contain a labile hydrogen atom.

Lead tetra-acetate is supplied in the form of white to pink crystals moistened with glacial acetic acid, active ingredient 85-95%. It is pointed out by the manufacturer that the compound is not indefinitely stable to storage and should, therefore, be ordered for immediate use.

Lead-Free Glass

NP888

A new Corning lead-free glass will make television tubes lighter, cheaper.

A new glass developed by Corning Glass Works is going into the manufacture of television picture tubes. The glass contains no lead and will reduce the weight of the bulb approximately 15 per cent.

Full-scale production will begin immediately at Corning to allow manufacturing and service tests by television tube makers. On successful completion of the tests, the new glass will be adopted for the production of all bulbs for picture tubes.

The glass currently used for television bulbs contains a large amount of lead, which adds to the weight of the tube. As Corning's new glass contains no lead whatsoever, bulbs will be lighter in weight as well as less costly to produce. For example, the 16-inch bulb, which weighs 21 pounds, will weigh only 18 pounds when made of the new glass.

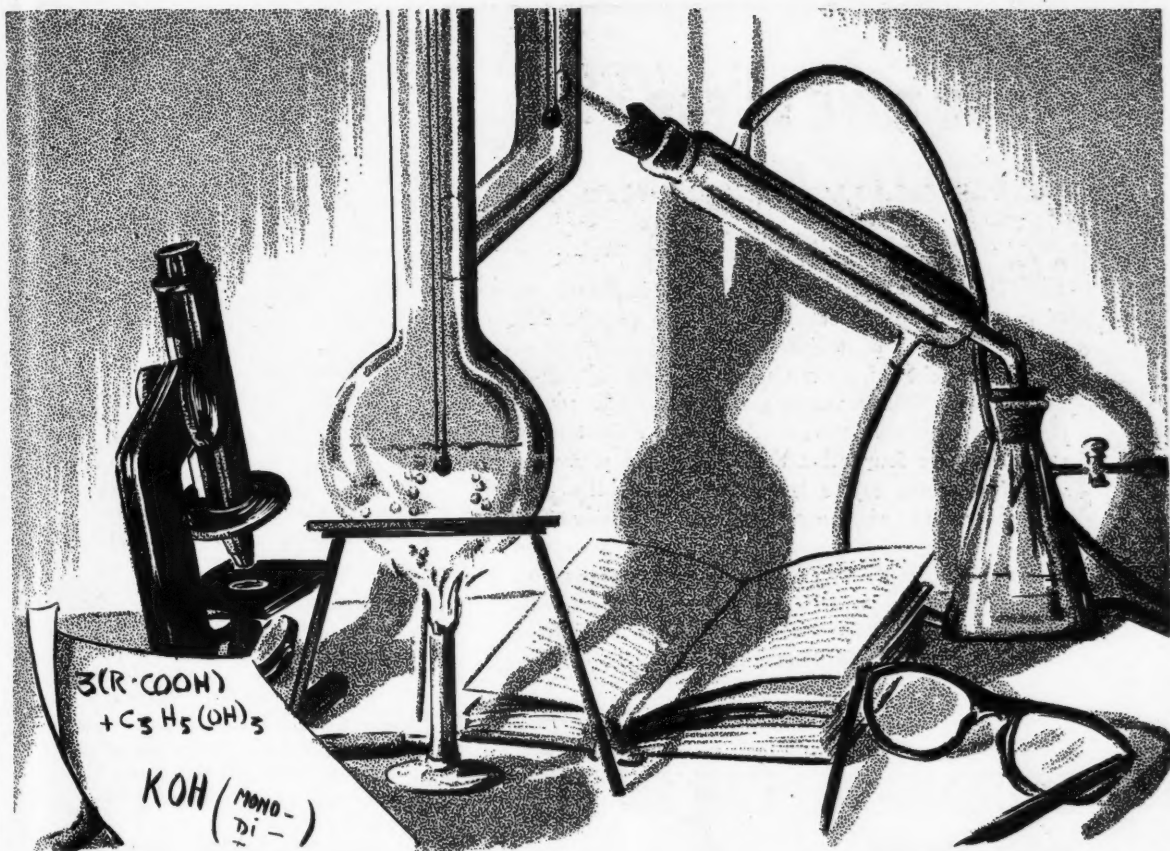
Gas Odorant

NP889

New odorant is especially designed for use in low-pressure gas (LPG).

Oronite Chemical Co. has added to its line of gas odorants "Oronite LPG Odorant," which is being offered especially for odorizing LP-Gas.

Like natural gas, LP-Gas is odorless in its natural state and an odorant is



SEARCH and RESEARCH

A. GROSS PRODUCTS

Stearic Acid
Tallow Fatty Acids
Red Oil (Oleic)
White Oleine
Coconut Fatty Acids
Cottonseed Fatty Acids
Soya Fatty Acids
Saponification
Crude Glycerine
Stearine Pitch
Cottonseed Pitch
Hydrogenated
Tallow Fatty Acids

Search and research at A. Gross' laboratories never stops. We can give you many examples of the results. For instance, there's A. Gross' Stearic Acid for monostearate production which is noted for its color stability, mildness of odor and assurance of longer shelf life of end products.

Or there's the Gross series of Coconut Fatty Acids—every one of their merits confirmed by actual plant results. Or the Gross Red Oil with its preferred odor, low titre, comparative purity. We could continue along these lines but why not write for our booklet describing Gross products today? Better still, why not ask for a sample, too?

Manufacturers since 1837

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WE'VE DONE IT FOR DETERGENT MAKERS

*W*ITH fragrance playing so vital a role in the success of soaps and sanitary chemicals, it is no surprise that the manufacturers of liquid and powdered detergents—latest and lustiest of the modern home cleaning aids—are seeking a like means of gaining favor and advantage over their competitors. Already, certain leading producers have found that the efficient and *pleasantly scented* detergent enjoys larger repeat sales than the unscented product whose appeal rests upon cleansing effectiveness alone. On the basis of our laboratory's successful activity in the broad fields of technical deodorization and perfuming, it has been our privilege to work with detergent manufacturers in developing odors appropriate to their needs and compatible with their limits of cost—which suggests that

PERHAPS WE CAN DO IT FOR YOU!

Yours may or may not be a problem of odorizing for added sales appeal . . . it may be one of odor masking for improvement of unpleasant working conditions with consequent betterment of employee efficiency and morale. Or it might be one of using aromatic principles to counteract or neutralize the presence of offensive chemical by-odors at certain stages of your product's processing. In any case, if you are faced with a problem involving odor, we urge you to forward the salient details to our Technical Perfume Division and let them apply their years of practical experience to finding a satisfactory solution.

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Brothers, Inc.



Est. 1871

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FACTORY: Clifton, N. J.

added for public protection, to warn of leaks before an accumulation of gas may be exploded by an open flame or an accidental spark.

A minimum safety factor of at least 5 to 1 is provided by natural gas utilities and as high as 10 to 1 by companies providing LP-Gas service.

Extensive research and field testing work is required for development of a satisfactory odorant. These compounds are the most intensely odorous chemicals that can be made, but the odor must be of such a nature as not to be objectionable when the gas is burned. It must not saturate textile material such as rugs and draperies. Gas odorants are highly volatile so that they will disperse uniformly throughout the gas, and the purity must be of a high degree so that deposits won't be formed on meters, diaphragms, valves and other minute openings in gas appliances to hinder their proper operation.

Calcium Arsenate NP890

Neutral calcium arsenate prevents decomposition of organic pesticides used in conjunction with it.

A new zero-lime calcium arsenate that may be successfully combined with organic insecticides for the control of virtually all cotton-infesting insects is manufactured by the Pennsylvania Salt Manufacturing Co.

To be marketed under the trade name Pencil, this special neutral-type calcium arsenate was developed at Pennsalt's plant in Bryan, Texas, for its Penco line of agricultural chemicals.

Pencil will be available for the current cotton dusting season, and it will cost the same as the regular calcium arsenate.

This new product was designed for combination with such organic aphicides and miticides as benzene hexachloride, DDT, and parathion. Chemical breakdown of the organic ingredients, which occurs where regular calcium arsenate is used, is prevented.

Pencil alone is recommended by Pennsalt for control of boll weevil, leafworm and boll worm. Combined with benzene hexachloride, it also eliminates aphids and fleahoppers. By adding parathion or sulphur to this mixture, spiders, too, may be controlled.

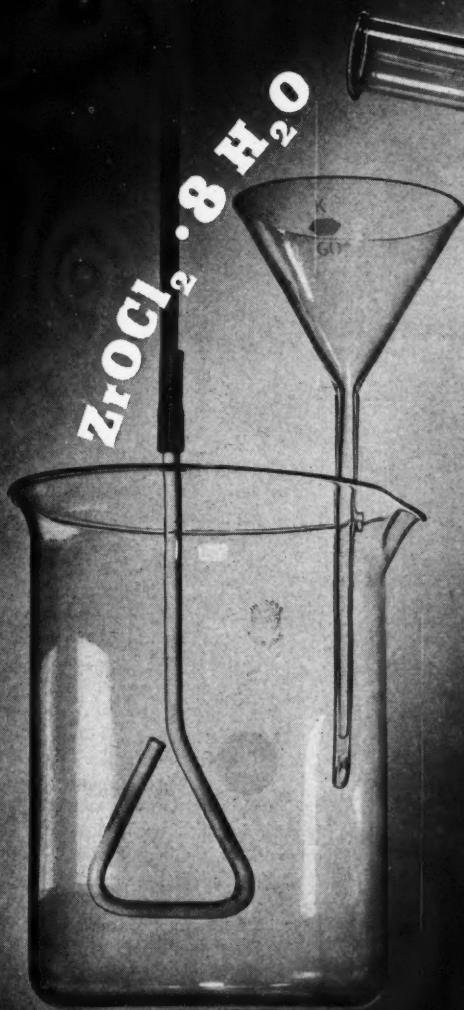
Wet-Strength Resin NP891

Urea-formaldehyde resin in powder form permits longer, more convenient storage.

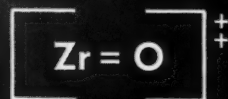
A new wet-strength resin said to be unique in its long-term stability and its adaptability to a wide range of paper products is now being produced in commercial quantities for the paper industry.

The urea-formaldehyde resin is Uformite 520, produced by the Resinous Products Division of Rohm & Haas Company.

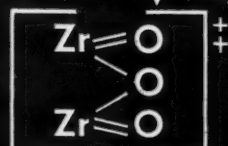
UNUSUAL IONS WITH USEFUL APPLICATIONS



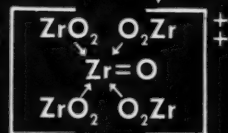
ZIRCONYL



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ZIRCONYL



POLYBASIC
ZIRCONYL



(Na_2CO_3)

($\text{Na}_2\text{CO}_3 + \text{heat}$)

Upon dissolving zirconium oxychloride in water, a number of ionic individuals is obtained. The preponderance of particular ions can be easily controlled by adjusting the temperature and pH of the solution. This permits a surprising number of physical and chemical properties to be realized from this one zirconium salt. These properties have already been successfully exploited

in the preparation of a wide variety of chemical products. Many additional uses are in prospect.

Manufacturers interested in better catalysts, mordants, pigment lakes and toners, leather tanning, pharmaceuticals and numerous other chemical products may obtain detailed information through our New York Office.

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and identical with the well-known liquid Uformite 467 except that it is supplied in powder form. Its useful life—a year or longer—becomes important in mills where runs of wet-strength paper are sporadic or where storage and handling of liquid resins in the plant may be impractical. Like its liquid counterpart, it is designed to improve the retention of rosin size and other beater additives, to impart better fold as well as increased pick-resistance to printing papers, and to increase economically the wet-rub resistance of starch-clay coatings.

The Uformite 520, which is completely soluble in water and gives solutions water-clear in appearance, may be added directly to the beater, fan pump, stuff chest, head box, or at other points on the wet end of the paper machine where adequate agitation insures dispersion of the resin in the stock.

Metal Cleaner

NP892

Synthetic cleaner prepares metal surfaces for coatings or other treatments.

Quaker Formula 100, synergized synthetic cleaner, has been developed by Quaker Chemical Products Corp. to replace vapor degreasing, solvent cleaning, solvent-emulsion cleaning, and electrolytic cleaning for the removal of mineral oil-type soils.

This powder-type product is used at concentrations of .2 to 3 ounces per gallon with water as a tank-type cleaner in the temperature range of 180° F. to boiling. It will prepare metal surfaces for bonderizing, electroplating, painting, and other critical operations with immersion times of less than 2 minutes in the cleaning cycle.

Quaker Formula 100 can be applied to the cleaning of steel, brass, die casting, and aluminum. With the latter material, the extremely fine grained but superficial etch provided yields unusually good paint adhesion.

Metallic-Colored Polystyrene

NP893

Metallic colors in polystyrene molding pellets give articles simulating bronze and aluminum.

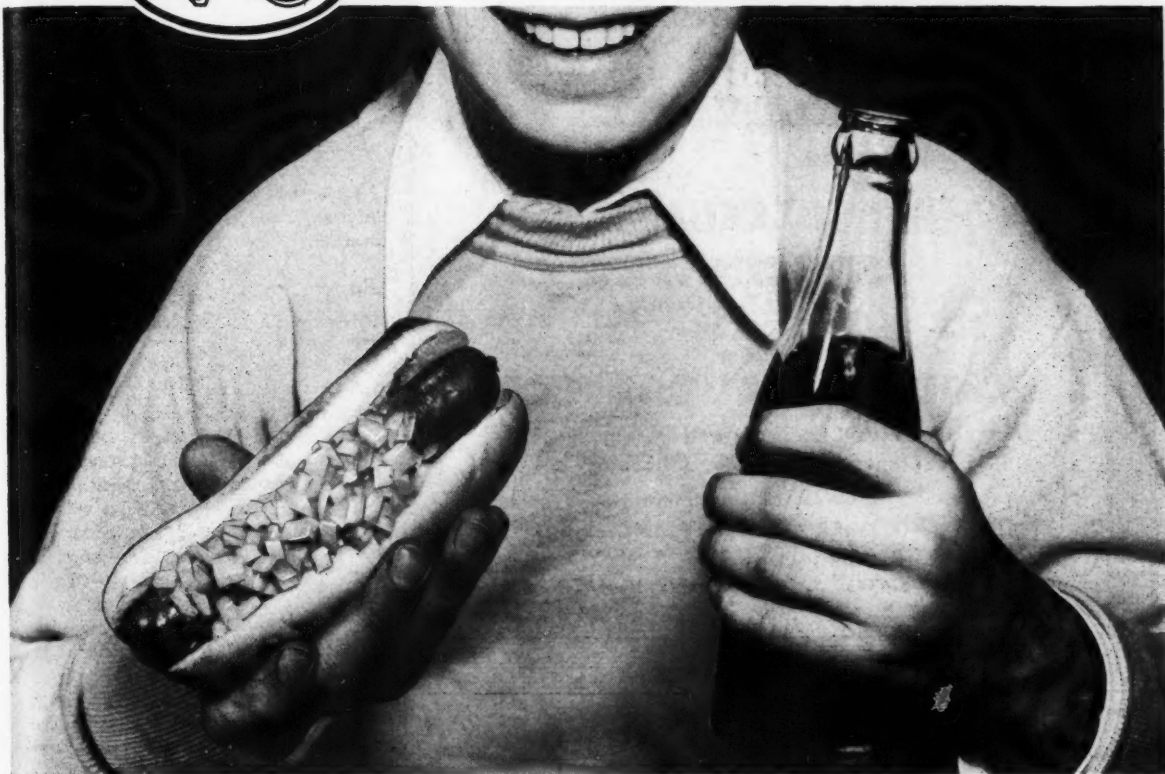
Two new metallic colors in Lustrex polystyrene, closely simulating bronze and aluminum and combining low cost with improved moldability, are offered by Monsanto Chemical Co. The two metallic Lustrex colors are said to be vitally important to manufacturers hard-pressed for metal.

The colors are available at an 11½¢ saving over previous metallics. Lustrex in metallic colors is scheduled at 32½¢ a pound in carload lots.

Molders will thus have available, in pelleted form, a polystyrene that has all the appearance of bronze or aluminum,



unseen factor in...



FOOD . . . and . . . DRINK

In the leavening of bread, cakes and crackers; as an acidulant in flavors and syrups; in the refining of sugar; for the clarification of fats, oils and extracts; in yeast foods; to prevent the crusting of cheese; in the meat packing industry; and in a myriad of manners preventing harmful biological action and promoting immaculate cleanliness . . . V-C Phosphoric Acid, V-C Calcium Phosphates, V-C Sodium Phosphates, V-C Sodium Metasilicate, V-C Cleansers, Ammonium Bicarbonate, Bicarbonate of Soda, Sodium Nitrite, Caustic Soda, and Industrial Alkalies are serving the food industry.

In water purification; as an acidulant; to promote the inversion of sugar; as a sanitizer; for carbonation; and as a cleanser for bottle washing and plant equipment in general . . . V-C Phosphoric Acid, V-C Bacats, V-C Sodium Polyphosphates, V-C Cleansers, and Industrial Alkalies are used. Thus V-C contributes to the enjoyment of pleasant beverages, and at the same time, to more efficient, more profitable operations for the suppliers.

For further information about these and other V-C Products write for V-C Chemicals Product Book.

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PHOSPHATE ROCK . SULPHURIC ACID . PHOSPHORUS . PHOSPHORIC ACIDS .
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at lower cost, and with improved moldability, appearance and unimpaired strength.

Brittleness and the high cost of manufacturing—two obstacles in prior attempts to approximate the new colors—have been eliminated. The new Lustrex metallic colors have the same strength and flexibility of regular polystyrene.

With Lustrex, manufacturers will be able to get more pieces per pound than would be available from a similar amount of copper or aluminum, a factor offering a major advantage to injection molders in competition with fabricated metal items.

Paper from Straw

New mechano-chemical pulping process will expedite paper production from straw.

A new process for making paper pulps from wheat straw, developed by the U. S. Department of Agriculture's Bureau of Agricultural and Industrial Chemistry, will help to boost eventual production of fine papers from straw and also will enable manufacturers of strawboard for boxes and packing materials—now the major industrial users of straw—to turn out a better product at lower cost.

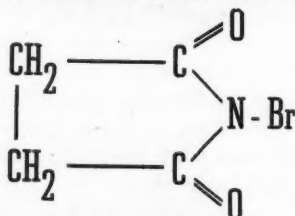
Adaptable for pulping various types of fibrous farm residues, the process depends largely on speeding up ordinary chemical pulping or "digesting" of the straw by rapid mechanical beating and stirring, which is done in a specially designed open kettle.

This mechanical-chemical action eliminates the need for cooking the straw under pressure and drastically reduces the cooking time required. With present methods used in strawboard mills, the straw must be cooked under 25 to 60 pounds pressure for 4 to 12 hours. Using the mechano-chemical process, cooking can be done at atmospheric pressure and is completed in 1 hour.

The Bureau's Northern Regional Research Laboratory announced last year a process for making straw pulps that gave increased yields and a higher-quality product at lower chemical costs than conventional processes. This method, which involved the use of more effective digesting chemicals than had previously been employed, required cooking the straw under 100 pounds pressure for 2 hours. The laboratory chemists found recently, however, that when the more effective chemicals were used along with mechanical stirring, even larger yields of high-quality pulp were obtained after cooking the straw at atmospheric pressure for only one-half hour.

Tests of the mechano-chemical process in commercial operations will be undertaken soon. Pilot-plant studies made at the laboratory show that the process should substantially lower costs of high-quality straw pulps.

N-BROMOSUCCINIMIDE



FORM—Fine crystalline Powder.

SOLUBILITY—Slightly soluble in water, soluble in alcohol, insoluble in ether.

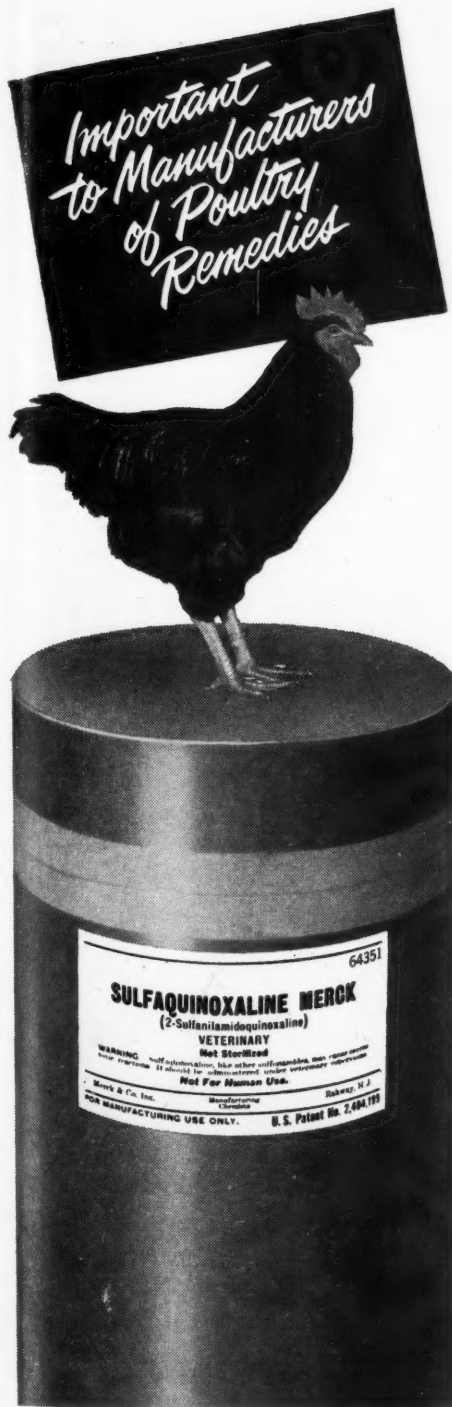
SUGGESTED USES: Manufacture pharmaceuticals, synthetic vitamins and hormones; as a brominating agent where it is desired to substitute bromine for an active hydrogen without adding bromine to an unsaturated linkage.

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What It Means To You:

A major achievement of Merck Research which can be made, immediately, a component part of your own production program. The introduction of Sulfaquinoxaline Merck enables you to supply poultry raisers with a superior product, effective against coccidiosis and acute fowl cholera.

What It Means To Your Customers:

An exceedingly active, versatile, and economical sulfonamide which may be used

- as a preventive against cecal and intestinal coccidiosis of chickens
- for the control of outbreaks of cecal and intestinal coccidiosis of chickens
- for the control of outbreaks of acute fowl cholera of chickens, turkeys and pheasants.

How Its Value Was Proved:

The impressive clinical advantages of Sulfaquinoxaline Merck were established by extensive trials at experiment stations and in the field. Published reports on this investigational work testify to the new agent's efficiency, economy, and recognized dependability.

How It Performs:

In addition to limiting outbreaks of coccidiosis and acute fowl cholera,

Sulfaquinoxaline Merck has been found to

- Limit mortality from coccidiosis (throughout extensive experimental study) to less than 2 per cent.
- reduce stunting which often follows uncontrolled coccidiosis
- permit birds to build immunity to the types of coccidia to which they are exposed
- reduce losses due to impaired feed efficiency
- permit farm flocks to maintain greater uniformity; better shank color; and to complete feathering at an earlier age.

HOW SUPPLIED:

Sulfaquinoxaline Veterinary Merck is a buff or yellow to light tan colored, odorless or practically odorless powder which melts at about 245 to 250°C. with decomposition. As supplied, it is substantially 325 mesh. Sulfaquinoxaline is relatively insoluble in water, 0.75 milligrams dissolving in 100 cc. at pH 5.2. It is soluble in sodium hydroxide solution forming the sodium salt.

A COMPLETE MERCK SULFAQUINOXALINE SERVICE:

- 1 Speedy shipment of required quantities from ample stocks.
- 2 Prompt assistance to manufacturers in methods for preparations of solutions and fabrication of soluble tablets.

Your inquiries are cordially invited. Write, wire, or phone today.

SULFAQUINOXALINE MERCK VETERINARY

MERCK & CO., Inc. *Manufacturing Chemists*

RAHWAY, N. J.

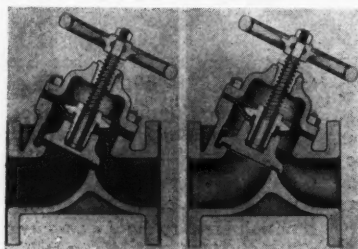


NEW EQUIPMENT

Diaphragm Valve QB 771

Crane Co.'s new diaphragm valves limit the diaphragm function to sealing the bonnet only.

Positive control of flow independently of the diaphragm is given by a separate seating member. This reduces the flexing to which the diaphragm is subjected and completely eliminates the diaphragm crushing action that is inherent in designs where the diaphragm itself is used to effect valve closure. Even in the



event of diaphragm failure, fluid cannot pass on to the line when the valve is closed. The new valve is considerably easier to operate than the diaphragm-closure type. Y-pattern body design gives greater flow capacity.

Plain iron and the other neoprene lined and coated valves are available. Both types have bolted bonnets. The plain iron valves are offered in sizes 1/2" to 2" with screwed ends; and in sizes 1/2" to 4" with flanged ends. The neoprene-lined-and-coated valves are being made with flanged ends only, in sizes 1/2" through 4".

In the unlined valves, a newly designed flat-face disc with neoprene insert has been used to assure tight seating under all conditions. The neoprene-lined-and-coated valves do not have such an insert, for the entire disc surface is faced with neo-

prene, which makes a seal with the neoprene-covered seat when the valve is closed.

These valves have rising-stem construction, sizes 2" and under having the stem rising through the handwheel and the larger sizes having the handwheel rigidly attached to the stem. The new valve is one of the increasingly popular types of "packless" valves. The plain iron valves are designed for services not exceeding 150 psi and 180° F. Temperature limitations on neoprene-lined-and-coated valves are dependent upon service conditions and the fluids carried. The neoprene-lined-and-coated valves are especially recommended for services where abrasion is a major destructive force.

Cast Iron QB 772

International Nickel has developed a new ductile cast iron.

A new ductile cast iron, which combines the process advantages of gray cast iron, such as fluidity, castability and machinability, with the product advantages of cast steel, has been developed by International Nickel Co. This material is characterized by a graphite structure in the form of spheroids, free from graphite in the flake form. Its excellent physical properties suggest its suitability for many applications hitherto considered beyond the scope of cast iron.

The production of this iron is based on the introduction into the iron of a small but effective amount of magnesium or a magnesium-containing addition agent, such as nickel-magnesium alloy.

The announcement states that the new material will take its place along with malleable iron, gray iron and cast steel in providing the needs of industry. It will be advantageous to overall foundry

practices as the new techniques should increase the importance of the foundry industry among metal producing industries.

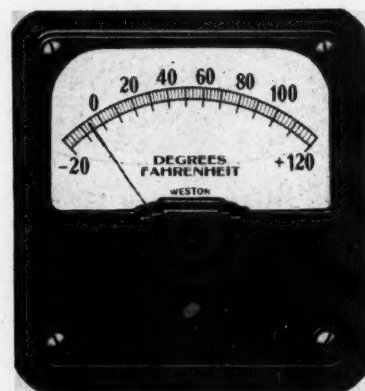
For pearlitic grades of cupola-melted material containing 3.2-3.6% carbon and 1.8-2.8% silicon, the ductile iron provides in the as-cast condition, a combination of 85/105,000 psi tensile strength, with some ductility. In contrast to gray cast iron, strength is only moderately affected by section thickness. Under stress it behaves elastically like cast steel rather than cast iron, having proportionality of strain to stress up to high loads, with a modulus of elasticity of 25 million psi.

Electric Thermometer QB 773

Weston Electrical Instrument Co. is producing a new electrical thermometer for remote and multiple indications.

The new thermometer, Model 918, employs a resistor bulb sensing element, which is readily placed at a remote location from the direct indicating instrument. Incorporation of a selector switch and multiple bulbs permits a number of temperature measurements with but one indicating instrument.

Weston describes the Model 918 indicator as a ratio-type instrument with a



scale over 5" long, having excellent control and damping, and showing quick response to temperature variations. It is designed for use on 100-130 volts, 50-60 cycles AC, and is not affected by normal line voltage variation. It can also be supplied for use on DC.

Paste Mixer QB 774

Abbe Engineering Co. has developed a new stainless steel heavy paste mixer.

Two sets of oppositely rotating, (23 rpm reinforced blades of a special scraper and agitator mechanism, mounted

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Please send me more information, if available, on the following items. I understand that nothing further may be available on some of them.

QB771	QB774	QB777	QB780	LE122
QB772	QB775	QB778	LE120	LE123
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...BUT...THIS KIND OF PROTECTION IS ONLY ONE OF THEIR FUNCTIONS

Bemis Waterproof Laminated Textile Bags are extra strong, and they're specially constructed to guard against:

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- Contamination
- Sifting losses
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1. Flexible creped kraft paper*
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* This may be parchment paper, or various plastic films, depending upon your requirements.

If you have a "hard-to-pack" product or one that must stand the rough handling of L.C.L., truck, or export shipment, it will pay you to investigate the advantages of Bemis Waterproof Bags.



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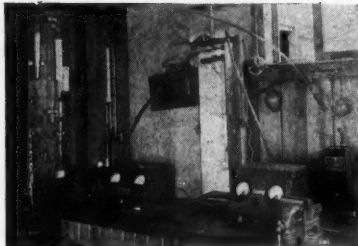
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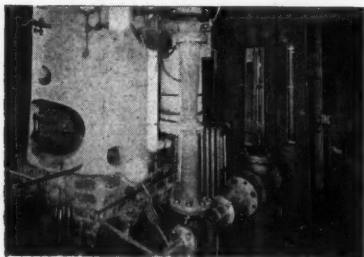
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What's Behind a C-R Evactor?

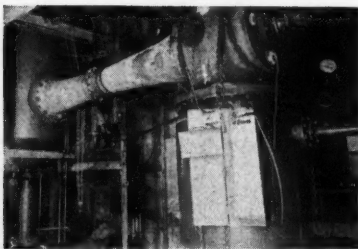
The production of Evactors is no routine operation at the Croll-Reynolds plant. Although CR engineers have over thirty years of industrial vacuum experience to guide them, the Croll-Reynolds testing and development department is one of the important units of the company. Development work is constantly under way to improve the efficiency of Croll-Reynolds Evactors wherever it is possible. It is this never-ending research and development which give CR Evactors their exceptional efficiency.



1. Instruments in the CR laboratory set up for measuring extremely high vacuum.



2. Special boiler in the CR pilot plant for providing unusual conditions of high pressure steam or superheat (or both) to duplicate the working conditions in customers' plants.

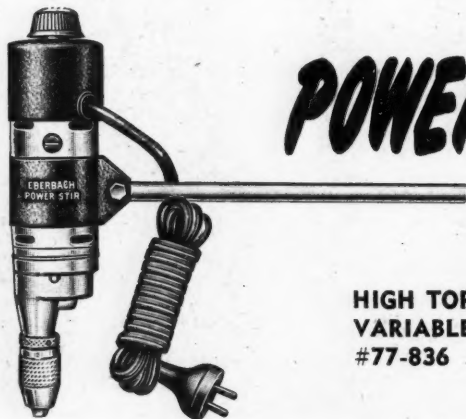


3. A 30-inch CR Booster Evactor on test in a CR shop.

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POWER-STIR

HIGH TORQUE
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Ask your dealer or us for literature on the Eberbach Power Stir, the reliable high torque variable speed laboratory stirrer. Speed range without load is 500 to 2400 r.p.m.; plastic knob controls speed and built-in off-on switch. Handy mounting rod 9" long by 1/2" makes it easy to adjust on any support. 1/20th H.P. motor develops high torque through 17 to 1 gear reduction. Weight, 4 pounds; height, 10 1/2". #77-837 stainless steel stirrers have 2" propellers with 1/4" shafts 12" long (\$2.25 ea.), 18" long (\$2.50 ea.) and 24" long (\$2.75 ea.). Write for literature today.

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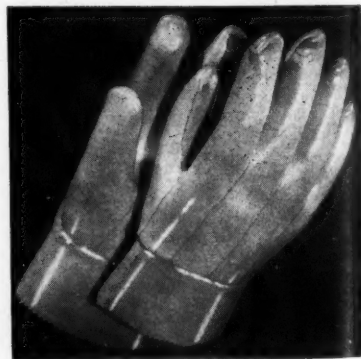
LABORATORY
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SON COMPANY

in the cover, are employed to break up the heavy or viscous and rapidly congealing mass thrown out by the mixing disc, while at the same time preventing it from adhering to the cylinder wall.

At the bottom, a motor with V-belt drive operates the stainless steel mixing disc at 600 rpm. This mixing disc utilizes the centrifugal force developed through the high speed horizontal rotation of its curved radial ribs to rapidly disintegrate and disperse the material to a fine, homogeneous state. For operation under vacuum or pressure, a dome cover is included.

• QB775 A new "Pull-Out" model in axial flow and mixed flow type pumps is being produced by Economy Pumps, Inc., Div. of Hamilton-Thomas Corp. "Pull-Out" pumps are so designed that all working parts are removable without breaking discharge connections. Suction bell, impeller, impeller housing, shaft, motor base and motor can be removed without disturbing the column and discharge elbow. This type of unit is particularly advantageous when the discharge elbow is below floor level, or when the pit in which the pump is installed is not easily drained. "Pull-Out" pumps are supplied in either cast or welded construction, and of alloy materials if specified. They are available in pump sizes up to and including a capacity of 100,000 g.p.m.

• QB776 The Sureseal PK coating on the new coated fabric work gloves of Surety Rubber Co., according to the manufacturer, surpasses rubber, and all



standard synthetics in resistance to virtually all industrial chemicals. Further, the manufacturer reports that the new glove shows higher resistance to abrasion.

Surety's new glove is available in knit wrist, band-top, and 12" and 14" gauntlet types. All types are jumbo size, with curved fingers.

• QB777 A steady, continuous, drain trap has been developed by the W. S. Rockwell Co. to eliminate alternate "fill and spill," steam and heat losses, steam, air and gas pressure drops, air binding, freeze-ups, hammer and chatter encount-

It takes **POWELL VALVES** to

complete your production picture

Everyone knows that in putting together a jig-saw puzzle picture it's simply a matter of putting the right piece in the right place.

In the case of flow control equipment the principle is the same. Because, only by installing the right valve—in design and material—to meet all the requirements of a specific service, can failures due to misapplication be eliminated.

Fortunately Powell *has been* applying this principle for more than a century. The result is a line of valves which is so complete that, for any set of flow control conditions encountered today, there's a Powell Valve that exactly fits all requirements.

So why not let Powell Engineers help you to complete your production picture by selecting valves that are specifically designed for your individual flow control services. Write us for details.

Fig. 1944—Large 150-pound Stainless Steel "Y" Valve with flanged ends, bolted flanged yoke-bonnet and outside screw rising stem. Sizes 2½" to 12", inclusive.

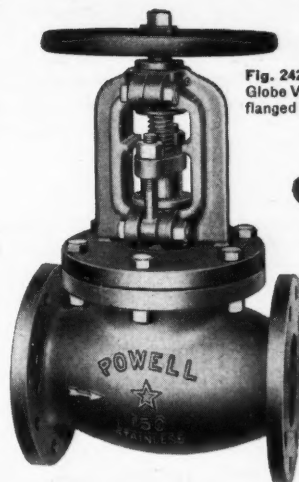
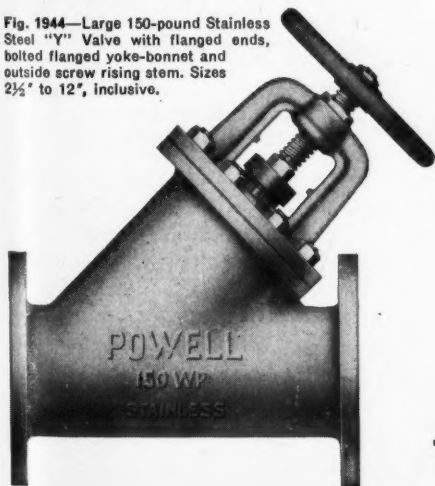


Fig. 2429—150-pound Stainless Steel Globe Valve with flanged ends, bolted flanged yoke and outside screw stem.



Fig. 2433—150-pound Stainless Steel Swing Check Valve with flanged ends and bolted flanged cap.

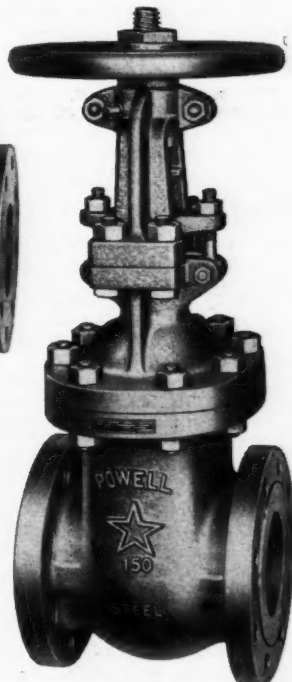


Fig. 1503—Class 150-pound Cast Steel Gate Valve with flanged ends, outside screw rising stem, bolted flanged yoke and tapered solid wedge.

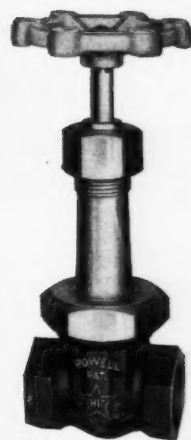


Fig. 375—200-pound Bronze Gate Valve. Screwed ends, inside screw rising stem, union bonnet, renewable wear resisting "Powellium" nickel-bronze disc.

The Wm. Powell Company, Cincinnati 22, Ohio

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POWELL VALVES

LOOK WHAT'S HAPPENING on the Texas Coast

NEW RUBBER TILE PLANT FOR HOUSTON

The Wright Manufacturing Company of Milwaukee is moving equipment into its new \$2,000,000 plant with plans to make Houston the home of "the aristocrat of flooring." Wright rubber tile is only one of the products that will be made from Texas raw materials. Others are conventional and custom-designed molded plastics for home and industry.

☆ ☆ ☆

PROGRESS REPORT ON CARTHAGE HYDROCOL

Construction is proceeding rapidly on Carthage Hydrocol, Inc.'s new Brownsville plant. Reports are they will be charging 90,000,000 cubic feet of natural gas a day and that the new plant's daily production will be 6,000 barrels of synthetic gasoline, 1,100 barrels of other petroleum products and 300,000 pounds of assorted chemicals. Completion is expected in the latter part of the year.

☆ ☆ ☆

TALL TALE . . . BUT TRUE

A Britisher who was indulging in boasting aroused the ire of a grizzled rancher.

"King Edward touched my grandfather on the shoulder with a sword and made a lord out of him," the Britisher said.

"That's nothing," the ranchman snorted. "Old Sitting Bull touched my grandpa on the head with a tomahawk and made an angel out of him."

☆ ☆ ☆

FOLLOW THE LEADERS

Headed by such names as Alcoa and du Pont, leaders in the chemical industry have moved Southwestward at a rapidly increasing rate in the past few years. Chemical investment along the Houston Ship Channel alone currently totals \$227,000,000. Attractions are unlimited quantities of acids, bases, fresh water and NATURAL GAS for hydrocarbons; reasons why your industry can profitably FOLLOW THE TREND TO TEXAS.

☆ ☆ ☆

To help you find out more about the area we serve, we will gladly: a, make a survey engineered to your company's needs; b, supply you with any special information you require; c, show you the coast country from Sabine to Rio Grande rivers — all in strictest confidence. Write, wire or telephone.

HOUSTON PIPE LINE CO.
Subsidiary of Houston Oil Company of Texas
GEO. A. MILLER, President
Wholesalers of
Natural GAS

ered in the use of intermittent discharge traps. The steam, gas or air condensate mixture enters the trap above the condensate. A slide valve and float mechanism regulates flow of condensate according to the volume of condensate accumulation in the trap. The outlet valve seals tightly when there is no condensation taking place thereby preventing unnecessary steam and heat losses. Condensate or foreign matter is easily removed from the trap by merely moving the drainage lever on the cover, in which case the valve is held open and the trap is blown clean by the steam, gas or air pressure. Movement of the slide valve vertically over the orifice with the rising or lowering of the float, helps prevent short-circuiting of vapor, while the cutting action of the slide continuously frees the valve orifice of sludge or other foreign matter in the line. There is no valve seat wear.

The Rockwell Steam Trap is manufactured in screwed or flanged types for 1/2", 3/4" and 1" pipe sizes, and for pressures of 150 psi and 300 psi and temperatures up to 750° F. Orifices are interchangeable, permitting an increased flow rate by a mere change of orifice size only. This eliminates the need for replacing the entire trap should capacity requirements increase. Since both inlet, and outlet are located on the same side of the housing, it is easy to provide for a by-pass.

• QB778 The Electric Steel Foundry Co., has added to its line of *stainless steel pipe fittings* by the regular production of fittings and centrifugally cast pipe up to 14" IPS to standard IPS and flange specifications cast in Esco Alloy 20.

This austenitic stainless steel is especially resistant to nitric-sulphuric acid mixtures. The alloy contains sufficient nickel to hold the copper in solution, which is essential for resistance to sulphuric acid. The chromium and molybdenum contribute additional resistance to oxidizing acids, and the resulting alloy is an austenitic stainless steel having the physical properties of the 18-8 group.

• QB779 New improvements to Nettco *agitator drives* have been made by New England Tank & Tower Co., for extra protection against leakage and shaft scoring. Incorporating the John Crane mechanical seals, it is said to eliminate leakage and protect products from contamination. The seal is standard equipment on Nettco drives Models WT, T, TA, TB and TAB without price increase, and is available for these models now in the field.

• QB780 Illinois Testing Laboratories, Inc., has developed a new flush-mounted *Velometer air velocity meter*, for permanent installation. This new unit is particularly suitable for permanent installation. Minimum range is 0-1000 fpm: dimensions are 7" x 6 1/2" x 2 1/4". One of the Velometer's prime advantages is the fact that there is practically a zero pressure drop through the instrument.

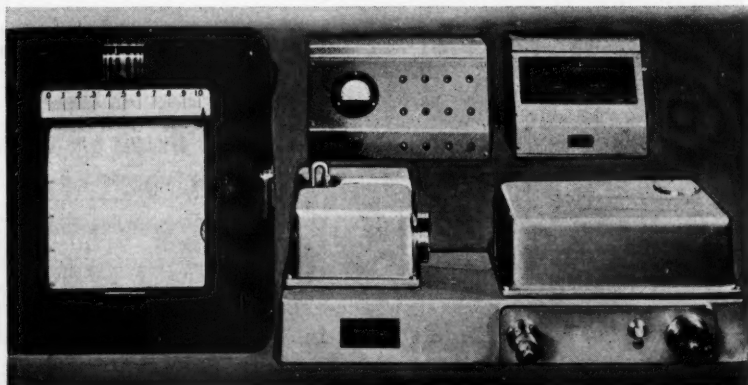
LABORATORY EQUIPMENT

Infrared Analyzer LE120

Perkin-Elmer Corp. has developed a new infrared analyzer for continuous automatic analysis of as many as six different components in a flowing stream of either a liquid or gas.

The new analyzer consists of an infrared monochromator, an automatically driven, twelve point turret (one reference standardization point and one absorption point for each of six components), a Leeds & Northrup, 12-point, strip chart recorder, and a highly stable, AC amplifying circuit to compensate for changes in ambient temperature, source intensity and window dirt. Cycling time for a six component analysis is approximately six minutes.

The Model 12-D Infrared Analyzer is particularly time saving in the pilot plant in determining optimum process conditions. Operating variables such as tem-



perature, contact time, flow rate, etc., may be varied continuously and evaluated immediately from the automatic analytical record. In a continuous, multi stage process, sampling may be performed at intermediate stages.

In the process plant, the instrument provides a permanent, accurate record of product concentration and purity as well as an immediate indication warning of process troubles.

• LE121 An improved laboratory manometer of Fisher Scientific Co., provides direct readings of vacua in millimeters, and is more stable than the ordinary manometer. The heavy glass manometer tubes and stopcock are cushioned in "Plastubing" mounted on steel upright support and heavy base. The manometer scale is calibrated from 0 to 300 mm. (rather than having zero in the middle of the graduations as with previous manometers).

Plastic tube clips permit easy setting of scale at zero on right-hand manometer column and quick adjustment of scale to meniscus in left-hand column. Difference between two mercury columns, due to evacuation, is then read directly.

• LE122 The Farrand electromultiplier photometer has been designed for general purpose measurement of very low light intensities. It is comprised of three

units: (1) detector, (2) power supply and controls, (3) galvanometer. Photomultiplier tubes affording high sensitivities are used as detectors and obviate the need for additional amplifiers.

By choice of a photomultiplier having optimum characteristics in the ultraviolet or visible region of the spectrum, the use of the photometer is readily extended to numerous, and broad applications concerned with photometry.

• LE123 A new full line of laboratory muffle furnaces designed for a temperature range from 300°F. to 2000°F. is now offered by the Cooley Electric Mfg. Corp. for physical, chemical and industrial laboratory use. Earlier furnaces have been controlled by rheostats and were limited in use from about 1150°F. or 1200°F. to the furnace maximum temperature without installation of extra controls.

Cooley Type MM in which is incorporated their Selective Power Modifier. This unit is essentially a synchronous motor-driven variable cam which operates an "ON" and "OFF" switch once each minute. The only power consumption is in the motor drive. The cam position controlled by setting knob permits varying the "ON" and "OFF" intervals so that any power input from 5% to full power may be obtained. Control is obtainable from about 300°F. to furnace maximum.

• LE124 A new device for the determination of melting points of chemicals, waxes, fats, etc., has been developed by Scientific Glass Apparatus Co., Inc.

The new Vanderkamp "Melt-Pointer" consists of three parts: body, chamber block and adapter. The upper section or block is carefully machined of solid copper. Three well-spaced holes around the melting point chamber of this block fit over three 110 volt 50 watt cartridge type heaters projecting from the base. Uniform heating, controlled by a suitable variable transformer, is thus achieved in the block and the chamber. A thermometer and three capillaries are held in position in the center of the chamber by an adapter plug.

The lower portion or body of the apparatus houses, in addition to the cartridge heaters, a small 110 volt light bulb below a window for the illumination of the interior of the chamber. This method of lighting from below results in exceptionally easy visibility, without any reflected glare from the mercury bulb of the thermometer. An opening in the body, shielded by a glass sleeve, permits observation of the capillaries through a magnifying lens. The lens may be easily focused by adjusting its position on its supporting bar. The entire body of the unit is well insulated to prevent disturbance by external temperatures.

DON'T THROW YOUR MONEY DOWN THIS WELL

Potdevin Labelers are a one time investment that will save you time every day, money every pay day. Initial price is low—installation costs nothing—any worker can operate a Potdevin. With daily cleaning and weekly lubrication your Potdevin lasts a lifetime.

And while you're writing for a Labeler—on 10 days free trial—consider a Potdevin Carton Gluer to speed up shipping operations. It's power driven—puts glue on carton flaps as fast as your men can handle them. Saves adhesives by controlling the glue film—applying it only where it's needed.



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1282-38th Street Brooklyn 18, N.Y.

Please send me a Potdevin Labeler on 10 days free trial—and details on Potdevin Carton Gluers.

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PACKAGING & SHIPPING

by T. PAT CALLAHAN

PMMI Spring Meeting

Packaging Machinery Manufacturers Institute will hold its spring meeting on May 9, at the Hotel Dennis, Atlantic City. The committee on arrangements, consisting of George W. von Hofe, New Jersey Machine Corp.; Carl E. Schaeffer, Stokes and Smith Co.; Wallace E. Coughlin and K. M. Peterson, Pneumatic Scale Corp., have announced that the PMMI members will have a group get-together on Sunday evening, May 8, with an all-day business meeting on Monday, May 9, and the semi-annual banquet that evening. All meetings will be held at the Hotel Dennis, which is headquarters for PMMI members during the week of the Packaging Exposition to be held at Atlantic City, May 10-13.

According to announcement by H. Kirke Becker, president, Peters Machinery Co., who is president of the PMMI, the seventeenth annual meeting of the institute will be held from October 31-November 2, 1949, at the Edgewater Beach Hotel, Chicago.

Packaging Seen Key to Low Costs, High Sales

Lower production costs and a greater stimulus to sales in a buyers' market will result from increasing management emphasis on improved methods of consumer and industrial packaging, packing and shipping. This is the view of the Planning Council of the Packaging Division of the American Management Association.

The 20 members of the AMA Council represent suppliers and users of packaging and packing machinery, materials, design and services used in making the packages and containers in which the nation's goods are moved from producer to consumer. The council view was made known following a meeting at which the group made preliminary plans for the National Conference on Packaging, Packing and Shipping to be held concurrent with the first three days of AMA's 18th National Packaging Exposition in Atlantic City, May 10 through 13.

According to J. D. Malcolmson, AMA packaging vice-president and technical advisor, Robert Gair Co., New York, the AMA Planning Council sees the following among problems whose solution will make possible lower production costs and greater sales:

1. Better organization and administration of the packaging, packing and shipping function.
2. Closer coordination between pack-

aging, packing and shipping and production and sales.

3. Effective use of the package in advertising, sales promotion, and at the retail outlet to increase sales.

4. Design of packages to better meet physical handling requirements during distribution.

5. Improved shipping techniques to reduce loss through damage.

6. Better selection of materials to meet product and production requirements.

7. More efficient plant layout, packaging machinery and packaging methods to cut production costs.

Packaging, production, merchandising and shipping executives, technical specialists, designers from all over the nation will discuss recent experience in the solution of these problems during the six sessions of the AMA conference in May.

Ludington Feted as Howe Assumes TBMA Presidency

At the annual meeting of the Textile Bag Manufacturers' Association held recently in New Orleans, F. H. Ludington, retiring president, was honored for his service to the association during his three-year term in that capacity. A resolution lauding his efforts in behalf of the association was adopted at the meeting, and he was presented with a gold wrist watch.

Homer V. Howes of Bemis Bros. Bag Co. was elected to succeed as president.

Mr. Ludington, president of Chase Bag Co., served the Association as vice-president for eleven years preceding his election to the office of president and will remain active as a member of the executive committee.

Company Earnings

Reports of annual earnings of companies concerned with packaging and shipping include the following:

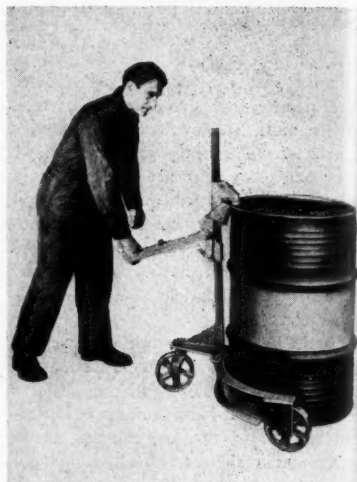
Company	Net Income After Taxes 1948	1947
Continental Can Co., Inc. and subsidiaries	\$14,811,562	\$12,809,543
Rheem Mfr. Co.	3,162,903	3,606,915
St. Regis Paper Co. and subsidiaries	14,859,803	14,631,325

Drum and Barrel Handler Combines Speed, Safety

An improved three-wheeled carrier, tradenamed Drumobile, and manufactured by Ernst Drumobile Division, Brantwood Products, Inc., Buffalo, N. Y., is designed to lift, transport and release any size or type of steel drum, wood

barrel or cylindrical fibre container. Model 800 Series now available is designed for loads up to 850 pounds in 50 to 60 gallon sizes.

Now improved and mass produced for quantity distribution, Drumobile is claimed to possess many advantages in addition to safe and speedy handling. It picks up the container, carries it in a



level, upright position and deposits it gently without tilting, thus eliminating the risk of spilling. Scarcely wider than the drum itself, it can be operated in close quarters where conventional carriers would generally be restricted. The lever-handle, after serving its function in lifting the load and actuating the safety lock, becomes a vertically free-swinging steering column adapting itself to any desired height. Its fulcrum is so located as to provide tremendous mechanical advantage at the end of its 17½ inch length. The same leverage principle is employed on the welded chassis which is equipped with a choice of three accessory gripping devices for steel drums, wood barrels or rimless fibre containers.

Neither the gripping mechanism nor any other part of the vehicle will dent or puncture any container.

Prices range from \$87.50 for steel drum model, \$92.50 for wood barrel model to \$99.50 for combination drum and barrel model, F.O.B. Buffalo, N. Y.

Faulty Packing Endangers Export Markets

"Containers and Packaging," a quarterly issued by the United States Department of Commerce, recently carried a commentary on export packing that is of particular interest in view of the close attention now being paid to proper export packing.

It emphasized that poor packing causes losses that can endanger United States foreign markets. The failure of any shipping container to deliver its contents in usable condition means not only the loss

Let a ST. REGIS Engineer Help You Sell More— Save More



St. Regis multiwall paper bags and valve bag filling machines cut labor and container costs and at the same time speed up packaging operations. They build brand preference because customers like clean, easy-to-handle multiwalls.

A St. Regis man will tell you, too, about the variety of protective plies available to produce a bag specially engineered for your product.



If you pack a granular, pulverized or powdered product, look into the advantages of a St. Regis Packaging System. There is no cost or obligation for advice and for the actual blueprint plans for conversion to paper.



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ST. REGIS—WORLD'S LARGEST MANUFACTURER OF MULTIWALL PAPER BAGS

of contents to the intended importer, but lost effort in time, money, and labor to the shipper. A vast number of good export orders are lost simply because exporters do not show the customer, by their method of packing and shipping, that they are really interested in the condition of the goods on arrival at their destination.

While export shipping differs sharply from domestic shipping, the procedure of developing satisfactory export packages is not greatly different from that of developing satisfactory containers and packing for domestic service. However, the hazards that the export shipment will encounter before reaching its destination are greater.

Container Selection

In general, the following points should be given consideration when a decision is being made as to the most serviceable export shipping container:

1. The nature and value of the article.
2. The unloading facilities at the port of discharge.
3. The inland transportation system in the country of destination.
4. The climatic conditions en route and in the country of destination.
5. Amount and nature of transshipping that may be required en route to the final port of discharge.

6. The probable pilferage owing either to nature of goods or the country of destination.

7. The consular rules and regulations and customs duties of the country of destination. (In many countries duties are based on the gross weight of the shipment—the use of packing not needed for the protection of the product is costly.)

8. Other special conditions determined only through actual knowledge of conditions in the particular country of destination.

The Department of Commerce has received many complaints from abroad on the inadequacy of our packaging. One point stressed is that United States exporters use light-type containers which will not meet the strenuous handling to which export packaging is subjected, when the nature of the shipment clearly indicates the necessity of using material of high tensile strength. Exporters are reminded that more potent competition will soon have to be met and the manufacturer whose exporter has cultivated the good will of his customers will stand a better chance of marketing his products.

Poor Economy

Although the use of inferior containers, packing and crating is apparently occasioned by a desire to reduce costs, ship-

pers to the Philippines, for example, are now suffering losses far greater than the cost of first-class packing. The broken containers left lying on the piers tend to invite pilferage, even though the goods may not be hopelessly damaged. Most of the breakage is said to occur on shipboard, particularly during the typhoon season when cargo is often badly shaken. Pier breakage is said to have been reduced to a minimum.

For many years, the Department of Commerce has stressed the importance of adequate and satisfactory packing of merchandise. It has emphasized that it is an economic waste to spend time and money to design, manufacture, and package a product if, through lack of attention to proper packing, the article is later damaged or rendered completely useless or unsalable when it has reached its destination.

Wide distribution was also made of the Department's publication entitled, "Modern Export Packing—1940," a comprehensive manual describing the basic principles of packing export merchandise. This book was prepared to acquaint shippers with tested and effective export packing procedures as a result of the criticisms of foreign importers regarding American methods of export packing. Copies of Modern Export Packing—1940 (Trade Promotion Series No. 207), are available from the Government Printing Office at \$1.75 per copy or through the Department's Field Offices.

PROMPT DELIVERY

HERCULES Aero
(RUBBER CUSHIONED)

AND

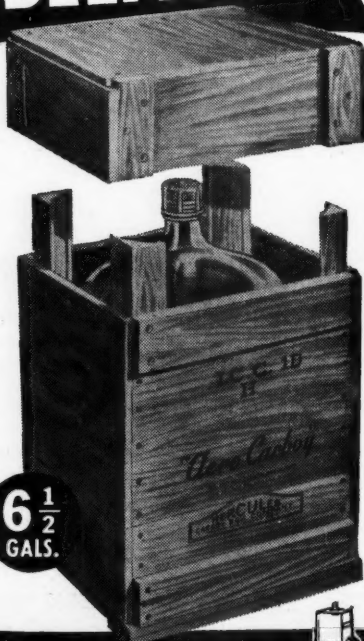
HERCULES
(CORK CUSHIONED)

CARBOY BOXES

available in

5 & 13 gallon sizes to comply with ICC-1A.

Available in 6 1/2 gallon size to comply with specification ICC-1D.



**6 1/2
GALS.**

NATIONAL BOX & LUMBER COMPANY

HOME OF HERCULES CARBOY BOXES • NEWARK 5, N. J.



Extends Stock of Polyethylene Bottles

For the first time since it introduced squeezable bottles of polyethylene, the



Plax Corp., Hartford Connecticut, has in stock a complete selection of Boston Round bottles for immediate delivery in natural polyethylene color in 1, 2, 4, 6, 8 and 16 ounce sizes.

MCA Manual on Acrylonitrile

The Manufacturing Chemists' Association has published Chemical Safety Data Sheet SD-31 on Acrylonitrile, the 31st in the series of chemical product safety manuals prepared by them. Designed for supervisory staffs and management, the manuals concisely present essential in-



How many sales in a square yard?

It all depends on how well your package is designed to use the space—be it floor, shelf, or counter.

Remember, cans are compact. They stack easily into eye-catching displays. They encourage impulse buying.

It's evident, therefore, that one of the most profitable ways of putting a square yard of store space to work for the retailer (*and for you*) is to pack your product in metal containers.



This trademark is your assurance of quality containers. Look for it!

AMERICAN CAN COMPANY
New York • Chicago • San Francisco

FIVE OTHER WAYS CANS WORK FOR SALES AND PROFITS

1. Cans are break-proof.
2. Cans protect contents against light, air, insects, and moisture.
3. Cans are light—mean lower shipping costs.
4. Cans are tamper-proof.
5. Cans are easy to open and dispose of.

formation for the safe handling and use of chemical products.

The bulletin may be obtained at 20 cents per copy from the Manufacturing Chemists' Association, Washington, D. C.

High Production with Soap Flake Filler

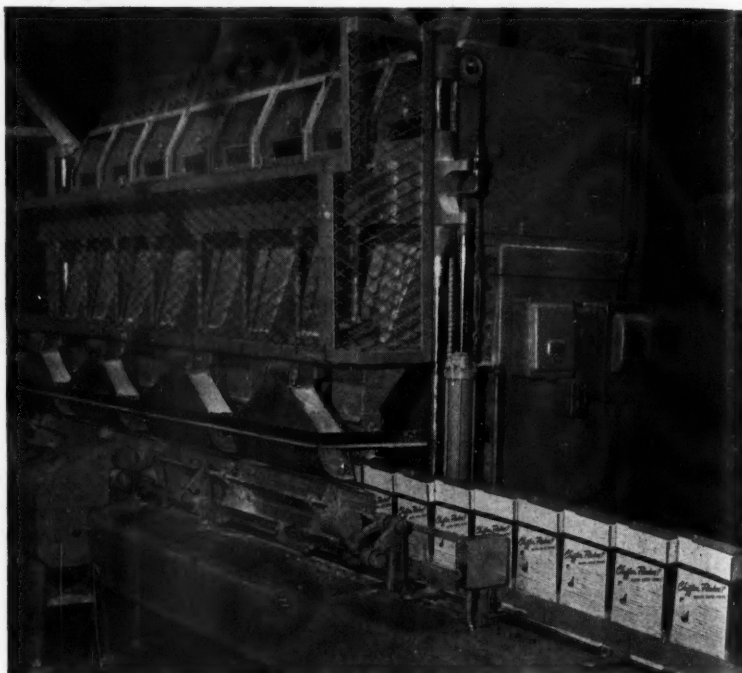
Armour & Co., manufacturers of Chifon Soap Flakes, found that the demand for their product was not being met by their production facilities. They required highly accurate filling of each container, and had to maintain a constant flow at rapid and uninterrupted speed.

The over-all operation involved several separate and distinct problems, each of which had a bearing on the final handling of the completed package in the proper condition and at the required speed. The material was extremely difficult to handle. The small diamond flakes were fragile, and could not be broken or mashed. An exacting tolerance was required on each and every container filled. Production demands were in excess of 75 packages per minute. Some sort of plunging device was required to compress the correct weight of flakes into each package, because in their loose and normal state they occupied approximately $2\frac{1}{2}$ times the actual volume of the container.

The accompanying picture illustrates

the weighing and filling unit, specially designed by engineers of the Triangle

Package Machinery Co., Chicago, Ill., and adapted to meet the above outlined re-



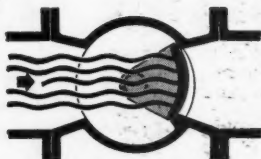
Special equipment permits production rate of 75 packages a minute.

A QUARTER-TURN TO

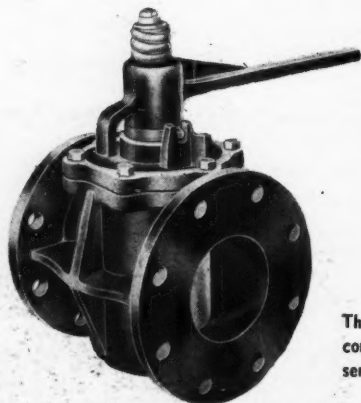


FULL FLOW

A QUARTER-TURN TO



DRIP TIGHT



DeZURIK EASY-OPERATING PLUG VALVES are well-named. They're EASY to operate—a quick quarter-turn delivers wide-open flow or dead-tight closure, with accurate control in between.

DeZURIK'S ECCENTRIC PRINCIPLE does away with binding and scoring. The rubber-faced plug contacts the body-seat only when closed, but then it closes surely, securely—every time—without distortion or distention.

The 1949 DeZurik Catalog contains over 400 specific service recommendations.

Ask for your copy.

DeZURIK SHOWER CO.

49 STEARNS ROAD
Sartell, Minnesota

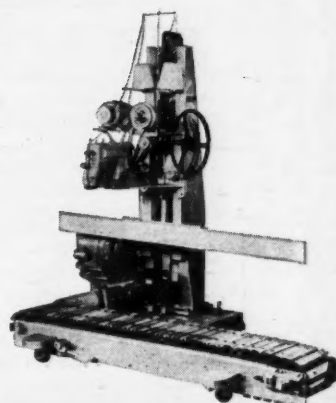
These Bagpakers® permit use of the shortest length open mouth multiwall bag possible. Savings often run to 3 or 4 inches per bag. The strong "cushion stitch" closures absorb strains of handling or dropping, and will hold your materials dependably. Closing speeds? Up to 15 heavy-duty multiwalls per minute. And note how rugged the equipment—it's designed for trouble-free operation, day after day...year after year. One machine sews closures at high speeds; the other, in addition, adds tape over the closures. Write for full details and a proposal.

MULTIWALL ECONOMIES
HIGH-SPEED PACKAGING

get both with
Bagpakers!

BAGPAK
DIVISION

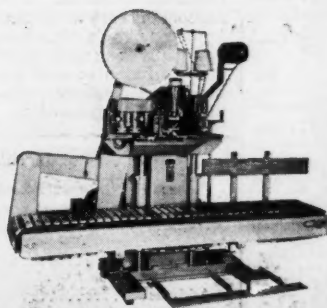
INTERNATIONAL PAPER COMPANY, Bagpak Division - 220 East 42nd St., New York 17, N. Y.
Branch Offices: Atlanta, Baltimore, Boston, Chicago, Cleveland, Baxter Springs, Kansas,
Los Angeles, New Orleans, Philadelphia, Pittsburgh, St. Louis, San Francisco,
In Canada: Continental Paper Products, Ltd., Montreal, Ottawa.



SEWS THE FAMOUS BAGPAK® "CUSHION STITCH"



MODEL "E-1" (portable) — closes up to 15 bags per minute. A single foot pedal controls both conveyor and sewing head. Handles both paper and textile bags.



SEWS A TAPED CLOSURE—moisture-resistant, sift-proof, tough.



MODEL "DA" (portable) applies tape over "cushion stitch", making a tight seal. One operator, filling and closing, can handle 2 to 4 bags a minute... 6 to 12 where filled bags are delivered to BAG-PAKER conveyor.

MEMO FROM J.B.

Anhydrous Ammonia
has possibilities —
follow this up!

J.B.

A versatile industrial chemical with wide experience in the following fields . . .

REFRIGERATION — Have had years of experience as chief refrigerant in making ice, quick freezing and refrigerating perishable foods.

ORGANIC CHEMICALS —
Experienced in production of
such organic chemicals as
amines, amides, nitriles, etc.

RUBBER—Have proved successful when added to raw latex in preventing coagulation during transportation from rubber plantation to factory. Used, too, in the vulcanizing process for manufacture of shoes, boots and rubberized fabrics.

PETROLEUM — Have spent considerable time in the petroleum industry in the refining of some crude oils, serving as a neutralizing agent to prevent corrosion in acid condensers, heat exchangers, etc., of distillation equipment.

PHARMACEUTICALS — Have worked in this field as an important ingredient in the manufacture of sulfa drugs, vitamins, and anti-malarials.

YEAST — Have supplied nitrogen for growth of yeast and micro-organisms. Assisted in controlling pH in manufacture of yeast and industrial alcohol from strap molasses.

HYDROGEN — Can supply, when dissociated, approximately thirty-four cylinders of hydrogen from one cylinder of ammonia.

WATER PURIFICATION
—In conjunction with chlorine have proved very effective in purifying water.

Can also give excellent references for work in these fields: textiles, household cleaners, insecticides, dyes and intermediates. Available for prompt shipment in 100 and 150 pound bottle-type cylinders. For more information use coupon below.

MAIL THIS COUPON TODAY

Please send information on use of ammonia in

Name.....Title.....

Company.....

Address.....

City.....Zone.....State.....

GENERAL OFFICE—Young man with some knowledge of bookkeeping; experience not necessary; permanent position.

shoes; apply in person.
Shop. N. La Salle.

Ammonia Division

Armour and Company

1355 West 31st Street • Chicago 9, Illinois

North Bergen, New Jersey

ARMOUR

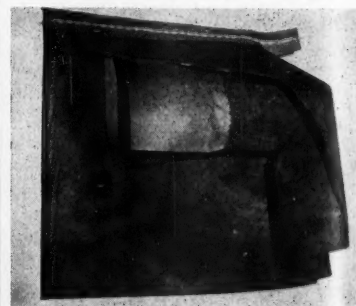
quirements. One of the prime requirements in accurate weighing is the proper pre-conditioning of the material, and the method developed for this particular application was the utilization of ribbon feed screws to evenly distribute the material to each of the 8 sections, which comprise the weighing machines.

Cartons are automatically fed to the intake of the conveyor, and control gates register the cartons in the proper relation beneath the filling spouts. In the event a carton is not under any individual spout, controls prohibit the machine from dispensing flakes. Air operated plungers compact the material without breaking the fragile flakes, and after the operation, cartons are released to enter the top sealing equipment. If for any reason the sealing operation is interrupted, the weighing unit stops automatically. Accurately filled packages are dispensed at the rate of 75 per minute.

There are 8 sections in the filling unit, and two parallel vibrating feed trays in each section. These are known as bulk and dribble trays, and dispense 80 per cent and 20 per cent of the load, respectively. Actually, both trays operate on the initial feeding, and when about 80 per cent has been dispensed, the larger bulk tray shuts off, and the dribble tray brings the package up to the correct weight. Signal lights are provided to indicate the proper operation of the equipment.

New Valve Bag Improves Filling Efficiency

The new Shur-Close Valve Bag, a development of Arkell and Smiths, paper bag manufacturers, Canajoharie, N. Y.,



has been tested by a leading fertilizer manufacturer, and found to increase filling efficiency. The new bag steps up the filling operation by approximately one bag per minute over the conventional L. C. Sleeve Bag. The Shur-Close Sleeve not only permits faster flow of the material being packed, but also prevents sifting. As the name implies, the valve closes tightly, thus eliminating waste from seeping.

The valve is adaptable to multiwall bags of any number of plies, and may be filled on all standard filling machines.



FULTON MULTIWALL PAPER BAGS

— any size, all types — pasted or sewn bottom, open mouth or valve. Fulton Multiwall Bags are of the uniform high quality you would expect a new modern plant to produce with the seasoned experience of top bracket personnel. We invite your inquiry.



**but *Fulton* WPPL BAGS
will keep your product dry!**

These bags are made from burlap or cotton goods laminated with a waterproof adhesive to a special quality crinkled kraft paper. The result is a sift proof and moisture proof package that is much stronger than an unlined textile bag.

In addition to protecting your product from moisture, Fulton WPPL (Waterproof Paper Lined) Bags offer you other important advantages over rigid containers. These include lower cost, ease of handling, less storage space, lower freight costs, and elimination of the burdensome record-keeping of returnable containers.

Fulton WPPL bags are available in a variety of linings and adhesives for specific commodities. Write our nearest plant for samples and prices.

Fulton BAG & COTTON MILLS

Atlanta • St. Louis • Dallas • Kansas City (Kans.) • Denver
Minneapolis • New Orleans • Los Angeles • New York

PLANT OPERATIONS NOTEBOOK

Methyl Chloride

Engineering procedures now available can be used in putting into effect the new American Standard allowable concentration for methyl chloride. This is the eighteenth in the series of national standards that define the amount of various toxic dusts and gases that can safely be permitted in the air of work places. The standards are being developed under the procedure of the American Standards Association by a committee of scientists and medical men with national reputations for work in improving industrial health conditions.

Widespread industrial use of methyl chloride as a catalyst solvent in the synthetic rubber industry, as an extractant for greases, oils, and resins, and as a dewaxing agent in the petroleum-refining industry has emphasized the need for defining the safe concentration.

According to members of the committee, the principal danger lies in the possibility

that repeated exposures to low concentrations of methyl chloride will result in dangerous absorption by inhalation rather than that acute poisoning may result from a single exposure to high concentrations. Symptoms that may be encountered are increasing fatigue, loss of appetite, drowsiness, muscular weakness, staggering gait, mental confusion, vertigo, visual disturbances, nausea, slurred speech, convulsions, and coma.

Values suggested for the maximum allowable concentration of methyl chloride have ranged from 100 to 500 parts per million. After careful consideration of available toxicological data and experience in handling methyl chloride in industry, it was decided that: "The maximum allowable concentration of methyl chloride shall be 100 parts per 1,000,000 parts of air by volume corresponding to 0.2 milligram per liter at 25 C and 760 mm pressure, for prolonged exposures not exceeding a total of eight hours daily."

NOMOGRAPH - OF - THE - MONTH

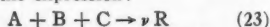
Edited by DALE S. DAVIS

Nomographs for Chemical Kinetics—III

by MELVIN NORD
Wayne University
Detroit, Mich.

Constant-Volume, Irreversible, Third-Order Reaction with Three Reactants

THE simplest type of third-order reaction, i.e., where there is a single reactant, has already been considered; Figure 3 of the previous paper¹ represents the solution for that case. Third-order, irreversible reactions at constant volume where there are three reactants are represented by the expression:



In this case, the rate equation is

$$-\frac{dC_A}{d\theta} = kC_A C_B C_C \quad (24)$$

Note that

$$\left. \begin{aligned} C_A &= C_{A0} - x \\ C_B &= C_{B0} - x \\ \text{and } C_C &= C_{C0} - x \end{aligned} \right\} \quad (25)$$

Substitution of Equation 25 in Equation 24 and integration between the limits of 0 and x and of 0 and θ yields

Readers are invited to submit for publication in this department original nomographs pertaining to the field of chemistry or engineering. \$10 will be paid if used.

$$\left. \begin{aligned} r_A &= \frac{C_{B0} - C_{C0}}{C_{B0} - C_{A0}} \\ r_B &= \frac{C_{C0} - C_{A0}}{C_{B0} - C_{A0}} \\ r_C &= 1 \end{aligned} \right\} \quad (29)$$

Determine the values of $r_A \log \left(\frac{1}{1 - \epsilon_A} \right)$,

$$r_B \log \left(\frac{1}{1 - \epsilon_B} \right) \text{ and } r_C \log \left(\frac{1}{1 - \epsilon_C} \right)$$

from the plot and evaluate

$$\Sigma r_i \log \left(\frac{1}{1 - \epsilon_i} \right) = r_A \log \left(\frac{1}{1 - \epsilon_A} \right) + \left(r_B \log \frac{1}{1 - \epsilon_B} \right) - \left(r_C \log \frac{1}{1 - \epsilon_C} \right) \quad (30)$$

With this value, enter the nomograph in the left portion of Figure 5. Connect this point with the corresponding value of time on the θ scale and note the intersection on the scale marked

$$\frac{k}{2.303} (C_{B0} - C_{C0}) (C_{C0} - C_{A0})$$

If the reaction is of the type of equation 23, all such intersection points on this scale will coincide. From the value on this scale and the values of C_{A0} , C_{B0} , and C_{C0} the reaction rate constant, k , can be calculated.

Fig. 5 was constructed on the basis that

$$C_{B0} > C_{C0} > C_{A0} \quad (31)$$

It should be noted that Equation 26 is

$$\frac{k\theta}{2.303} = \frac{\log \left(\frac{C_{A0}}{C_{A0} - x} \right)}{(C_{B0} - C_{A0})(C_{C0} - C_{A0})} + \frac{\log \left(\frac{C_{B0}}{C_{B0} - x} \right)}{(C_{B0} - C_{A0})(C_{B0} - C_{C0})} - \frac{\log \left(\frac{C_{C0}}{C_{C0} - x} \right)}{(C_{C0} - C_{A0})(C_{B0} - C_{C0})} \quad (26)$$

where $(C_{A0} \neq C_{B0} \neq C_{C0})$.

$$\text{Note that } \epsilon_A = \frac{x}{C_{A0}}, \quad \epsilon_B = \frac{x}{C_{B0}}, \quad \text{and } \epsilon_C = \frac{x}{C_{C0}} \quad (27)$$

and that Equation 26 can be written as

$$\theta = \frac{2.303}{k(C_{B0} - C_{C0})(C_{C0} - C_{A0})} \left[\frac{C_{B0} - C_{C0}}{C_{B0} - C_{A0}} \log \left(\frac{1}{1 - \epsilon_A} \right) + \frac{C_{C0} - C_{A0}}{C_{B0} - C_{A0}} \log \left(\frac{1}{1 - \epsilon_B} \right) - \log \left(\frac{1}{1 - \epsilon_C} \right) \right] \quad (28)$$

Since a complete nomographic solution of Equation 28 would be more complicated than circumstances warrant, recourse is made to the combination graphic and nomographic solution of Figure 5 in which the right portion is a plot of

$$r_i \log \left(\frac{1}{1 - \epsilon_i} \right) \text{ vs } \epsilon_i$$

for lines of constant r_i where i denotes A, B or C. The values of r_i are:

not applicable if any two of the initial concentrations are equal. If all three initial concentrations are equal, Equation 24 reduces to Equation 5, so that Figure 3 is applicable, instead of Figure 5. If two of the initial concentrations are equal, neither Figure 3 nor 5 applies. This case is discussed next.

Constant-Volume, Irreversible, Third-Order Reaction with Two Reactants
Reactions of the type

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follow the rate equation

$$-\frac{dC_A}{d\theta} = kC_A^2 C_B \quad (33)$$

where

$$C_A = C_{A0} - x$$

$$C_B = C_{B0} - \frac{x}{2}$$

Substitution of Equation 34 in Equation 33 and integration¹ between the limits of 0 and x and 0 and θ yields

$$\theta = \frac{1}{k} \left[\frac{x}{C_{B0} - \frac{C_{A0}}{2}} + \frac{1}{C_{A0} - 2C_{B0}} \ln \frac{C_{A0}(C_{B0} - \frac{x}{2})}{(C_{B0} - 2C_{A0})(C_{A0} - x)} \right] \quad (35)$$

Note that

$$\left. \begin{aligned} \epsilon_A &= \frac{x}{C_{A0}} \\ \text{and } \epsilon_B &= \frac{x/2}{C_{B0}} \end{aligned} \right\} \quad (36)$$

and that Equation 35 can be written as

$$\theta = \frac{1}{kC_{A0}} \left[\frac{\epsilon_A}{C_{B0} - \frac{C_{A0}}{2}} + \left(\frac{C_{A0}}{C_{A0} - 2C_{B0}} \right) \ln \frac{1 - \epsilon_B}{1 - \epsilon_A} \right] \quad (37)$$

Equation 37 is of an unsymmetrical type such that any nomographic solution would be too cumbersome to be practical. In this case, an ordinary graphical solution is indicated. Plot θ vs. the bracketed term in Equation 37 on rectangular coordinates. If the line is straight, the reaction is of the type of Equation 32, and the value of k can be determined from the slope of the line.

It is possible to use the nomograph in Figure 5 instead of the graphical plotting, if desired. In this case, enter the Σ scale with a value calculated from:

$$\Sigma = \frac{\epsilon_A}{1 - \epsilon_A} + \left(\frac{C_{A0}}{C_{A0} - 2C_{B0}} \right) \ln \left(\frac{1 - \epsilon_B}{1 - \epsilon_A} \right) \quad (38)$$

* * *

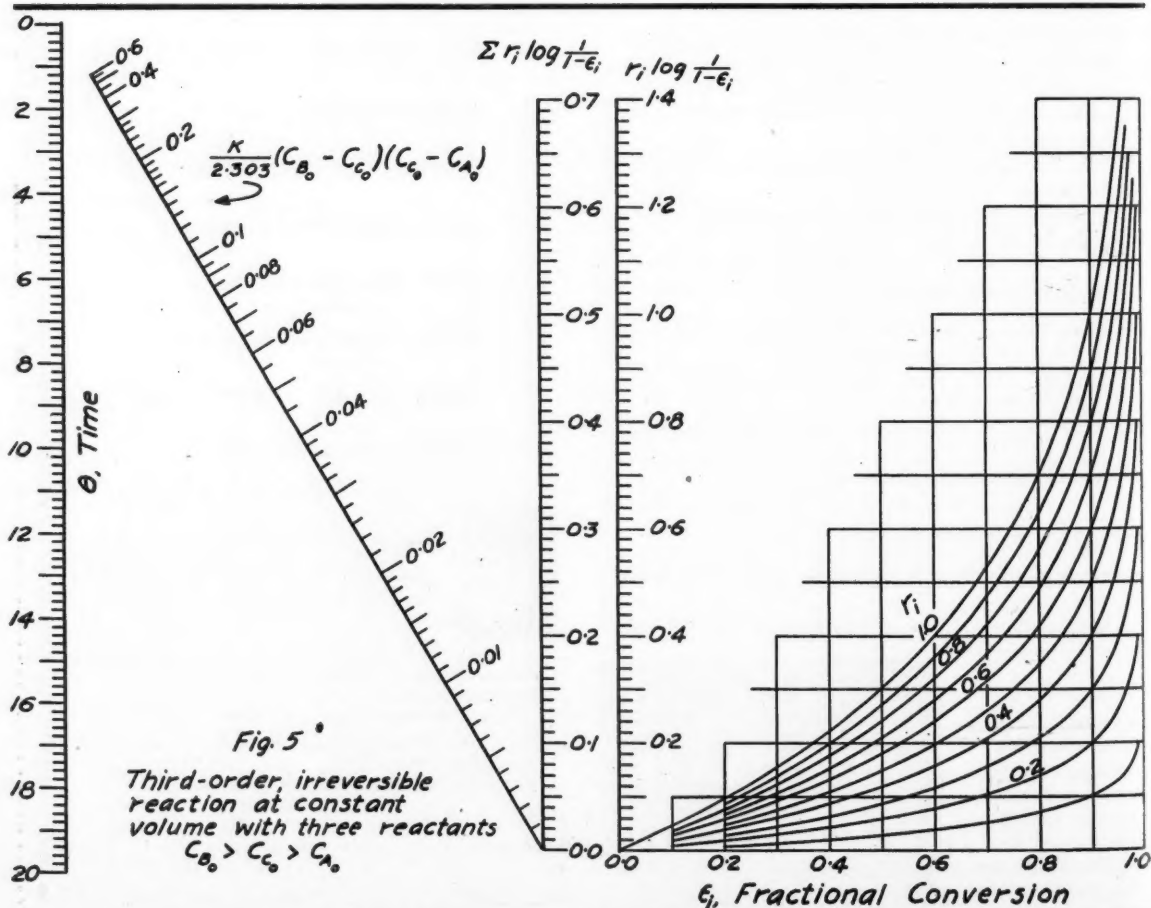
The following table presents consistent values and enables one to check the direc-

tions for the use of Figure 5:

C_{A0}	0.60	
C_{B0}	4.00	
C_{C0}	1.00	
x	0.50	0.40
θ	11	5.71
ϵ_A	0.833	0.667
ϵ_B	0.125	0.100
ϵ_C	0.500	0.400
r_A		0.882
r_B		0.118
r_C		1.000
$r_A \log \frac{1}{1 - \epsilon_A}$	0.687	0.421
$r_B \log \frac{1}{1 - \epsilon_B}$	0.007	0.005
$-r_C \log \frac{1}{1 - \epsilon_C}$	-0.301	-0.222
$\Sigma r_i \log \frac{1}{1 - \epsilon_i}$	0.393	0.204
$\frac{k}{2.303} (C_{B0} - C_{C0})$	0.0357	0.0357
k	0.0685	0.0685

Literature Cited

1. Nord, Melvin, Chemical Industries, 63, 668 (1948).





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3-Semicarbazidobenzamide
n-triacontanol
Potassium pyrophosphate trihydrate
Carboxymethoxylamine hemihydrochloride
Di-n-decyl amine
Vanillyl amine
1-Butyne-3-ol
Carene
1,1-Dibromopropane
2,2-Dibromopropane
9-Diethylaminorosindone
9-Ketostearic acid
2-Ketostearic acid
4-Hydroxystearic acid
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Temperature Scale

On January 1, 1949, the National Bureau of Standards began using the definitions of the International Temperature Scale of 1948, both in its own research program and in calibrating instruments for other scientific and industrial purposes. Based on a draft prepared by members of the Bureau staff, the new scale was adopted at Paris by the Ninth General Conference on Weights and Measures in October, 1948, and the official text was approved for publication before the end of the year. This is the first revision of the International Temperature Scale since its adoption 21 years ago.

The experimental difficulties inherent in the measurement of temperature on the thermodynamic scale (an ideal scale based on energy changes in a Carnot cycle) led to the establishment in 1927, of the practical scale known as the International Temperature Scale. This scale is based upon six reproducible equilibrium temperatures, or "fixed points," to which numerical values are assigned, and upon specified interpolation formulas relating temperature to the indications of specified standard temperature-measuring instruments. The scale is designed to conform, as nearly as practicable, to the thermodynamic Celsius* scale as it is now known. At the present time, however, it is possible to obtain values of temperature on the International Temperature Scale more accurately than on any thermodynamic scale.

The International Temperature Scale of 1927, proved useful in providing a stable, uniform, and precise basis for obtaining temperatures. However, since the adoption, the increasing precision attained in temperature measurements had made some revision desirable. To make

measurements of physical constants—for example, the freezing and boiling points of pure compounds—on a more exactly comparable basis by all laboratories. The major responsibility for proposing and obtaining agreement on the changes fell to the National Bureau of Standards.

The fixed points of the 1927 scale were the boiling point of oxygen (-182.97°C), the freezing and boiling points of water, the boiling point of sulfur ($+444.60^{\circ}\text{C}$), the melting point of silver ($+960.5^{\circ}\text{C}$), and the melting point of gold ($+1063^{\circ}\text{C}$). From -190° to $+660^{\circ}\text{C}$, the measure of temperature was based on the indications of a standard platinum-resistance thermometer used in accordance with specified formulas. From $+660^{\circ}\text{C}$ to the gold point, a platinum-platinum rhodium thermocouple was the reference instrument; and above the gold point, the optical pyrometer has been standard.

The same fixed points, with one slight modification, are specified in the 1948 scale, and the laboratory procedures for obtaining temperatures between fixed points are essentially the same as those previously used. Only two revisions in the definition of the scale result in appreciable changes in the numerical values assigned to measured temperatures. One of these is the change in the value for the silver point from 960.5° to 960.8°C , which affects temperatures measured with the standard thermocouple. Thus, in the range between 630° and 1063°C , numerical values of temperature are higher than on the 1927 scale, the maximum difference being about 0.4° near 800°C . The adoption of a new value (1.438 cm-deg) for the constant c_2 in the radiation formulas changes all temperatures above the gold point. In the new scale, Planck's radiation formula is specified instead of Wien's for calculating temperatures above the gold point as observed with an optical pyrometer.

There are several other important modifications in the scale which cause little or no change in numerical values for temperatures but serve to make the temperatures more definite and reproducible. For example, the standard platinum resistance thermometer is to be used as a reference instrument from the oxygen point to the freezing point of antimony (about 630°C), rather than over the range from -190° to $+660^{\circ}\text{C}$. Platinum of higher purity is also specified for the standard resistance thermometer and standard thermocouple, and smaller permissible limits are given for the electromotive force of the standard thermocouple at the gold point.

* The Ninth General Conference decided to abandon the designation "Centigrade" and use "Celsius" instead.

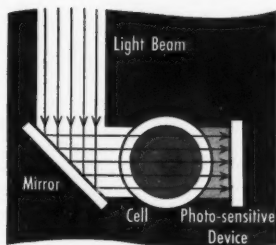
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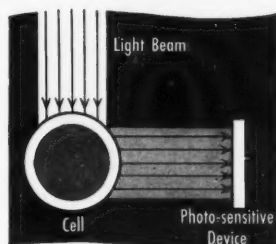
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2

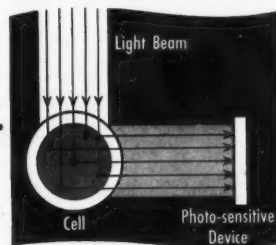
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Light of one wave length causes some substances to fluoresce or emit light (of a different wave length) which is measured at right angles to the incident light and related to the concentration.

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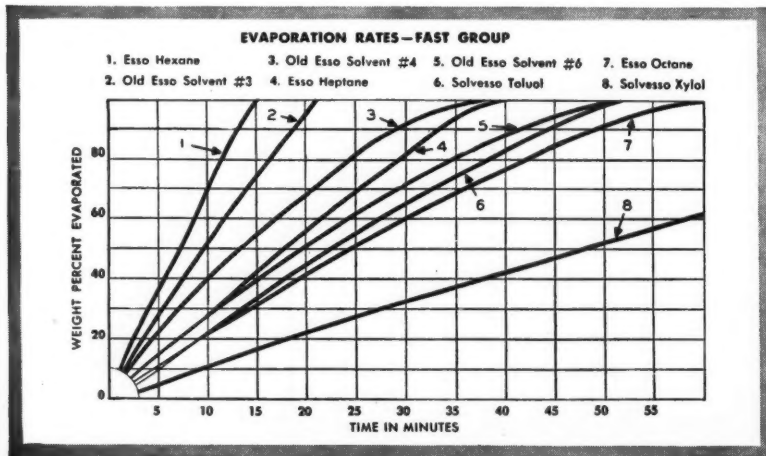
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Plants, Engine-Driven J174
Catalog sheet describes Katolight gas engine-driven plants of 500, 600, 1000, and 2000 watts. 2 pp., Form 1349, Kato Engineering Co.

Lubrication Control J175
3-p. circular, No. 300, illustrates a portable oil inspection kit whereby a mechanic can quickly measure the contaminants occurring in lubricating oil during use. Gerin Corp.

Shovel, Tractor J176
Catalog gives specifications and numerous action views of the new 4-wheel-drive Model HM Payloader, a 1½ cubic-yard tractor shovel. Frank G. Hough Co.

Steel Tubing J177
Bulletin TA-1398 points out methods of economically protecting food-product quality by preventing contamination, together with grades, sizes, and finishes of stainless Croloy tubing. Babcock and Wilcox Tube Co.

Battery Technology J178
40-p. packet handbook describes care and operation, maintenance and repairs, parts, and technical data on motive-power batteries. Gould Storage Battery Corp.

Tensile Testing J179
Bulletin illustrates Model TT-B, the new Instron tensile testing instrument, and describes design principles, drive mechanism, and load recording. 4 pp., Instron Engineering Corp.

Multiple Signals J180
"Series 300 Panalarms" describes multiple unit signals that permit a single horn to serve for many alarms. 10 pp., Panalarm Products, Inc.

Truck J181
16-p. catalog describes the revised Model "M" straddle truck, together with model views and operational photographs. Hyster Co.

Strap Selector J182*
Device reveals which metal strapping will, and which will not, give good service under specified condition, when user dials its arrow-head to type of chemical condition, atmospheric environment, etc. A. J. Gerrard and Co.

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 "What's New for the Laboratory" describes over a dozen new items of interest to laboratory technicians. 16 pp., Scientific Glass Co., Inc.

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 Bulletin No. D-491 contains photographs showing several ways in which a Sly dust filter may be installed for the collection of a variety of dust and for disposal of dust in various ways. 8 pp., W. W. Sly Manufacturing Co.

Conical Mills.....J186
 "Conical Mills for Dry Grinding" contains a general discussion of dry grinding, operational data, and specifications for Hardinge conical mills and other equipment. 36 pp., Hardinge Co., Inc.

Timer.....J187
 Bulletin describes function, application, features, construction, and prices of Cramer Type IG interval timers. Bulletin No. 130, 2 pp., R. W. Cramer Co., Inc.

Compressors.....J188
 2-p. bulletin gives detailed specifications, overall dimensions and shipping weight of Lorain single-stage and two-stage compressors. Bulletin F-2000, White-Roth Machine Corp.

Feeder.....J189
 Bulletin describes a new proportional feeder designed to provide a constantly proportioned feed of any corrosive, abrasive, or other materials. 3 pp., T. Shriver & Co., Inc.

Timer.....J190
 Features, specifications, and types of operation available of a new electronic timer described in Bulletin PC478, 4 pp., Photoswitch, Inc.

Valves, Plug.....J191
 Catalog of valve products with special attention to the rubber-faced eccentric-principle plug valve. Catalog 49, 34 pp., de Zurik Co.

Waste Treatment.....J192
 "Waste Treatment to Comply with Stream Pollution Control Regulations" describes briefly general problems involved and principal waste treatment methods. Bulletin 70, 8 pp., Inflico, Inc.

Tubes, Combustion.....J193
 Bulletin No. 214 describes McDaniel combustion tubes fired for high temperature furnaces, zirconium high-temperature combustion tubes, and combustion boats. 4 pp., Burrell Technical Supply Co.

Trucks, Lift.....J194
 Bulletin describes four low-cost Revolver power lift trucks, and includes dimension drawings. 4 pp., Revolver Co.

Pump, Boiler Feed.....J195
 A new bulletin, W-318-B7E, gives all data and specifications for four new boiler feed pump sizes—two 6" and two 8"—to the company's line of centrifugal pumps. Worthington Pump and Machinery Corp.

Process Equipment.....J196
 Brochure describes in detail many examples of

"Standard-Plus" complete process units, plants, and special process equipment. 12 pp., Industrial Process Engineers.

Pressure, Maximum.....J197
 Table lists maximum allowable working pressures in p.s.i. for seamless and electric-resistance welded carbon steel tubes or nipples for different diameters and gages of tubes. Technical Data Card #113, Babcock and Wilcox Tube Co.

Electrophotometer.....J198
 8-p. bulletin describes "The Fisher Electrophotometer, Standard Instrument for Colorimetric Analysis". Fisher Scientific Co.

Speed Reducers.....J199
 Directions for selecting speed reducers of the HP and speed required, together with descriptions of units of the single- and double-reduction types, specifications, HP rating tables, overhung load capacities, dimensions and weights, are contained in a new 44-p. bulletin. Bulletin 449, Farrel-Birmingham Co., Inc.

Steam, Underground Distribution of.....J200
 "Engineering Data for Underground Steam Distribution, Section 480-2" deals with layout of route, estimating steam loads, flow charts, properties of steel pipe and saturated steam. 34 pp., Ric-wil Co.

Piping, Insulated.....J201
 Booklet reproduces actual drawings used in insulated piping installations. "Typical Engineering Drawings—Section 480-3", 40 pp., Ric-wil Co.

Temperature Control.....J202
 "A Manual for the Modern Laboratory and a Catalogue of Requisite Equipment and Accessories" explains and describes constant temperature control devices of specialized design. 64 pp., Emil Greiner Co.

Gages.....J203
 Latest developments in Bailey Multi-Pointer gages are described in Bulletin No. 163-B, 8 pp., Bailey Meter Co.

Transmission Equipment.....J204
 Descriptive manual supplies complete data, including prices, on over 5,000 items of the company's line of power transmission equipment and conveyor supplies. "Forty-Niner", 192 pp., Patron Transmission Co., Inc.

Grinding.....J205
 Bulletin describes four advantages of Concavex grinding media. 4 pp., Allis-Chalmers.

High Vacuum.....J206
 Current information on developments in the field of high vacuum described in new bulletin. 8 pp., Distillation Products, Inc.

Water Cooling.....J207
 New loose-leaf catalog on water cooling equipment and industrial spray nozzles contains engineering information and data. Binks Manufacturing Co.

Chains, Cables, etc.....J208
 Booklet lists company's products including

chains, cables, wire rope, controls, brakes, etc., together with a list of its sales offices. 18 pp., American Chain & Cable Co., Inc.

Fittings.....J209
 Folder gives specifications for screwed, flanged, socket welding and butt-welding fittings; flanges, spuncast pipe. 6 pp., Electric Steel Foundry.

Trucks, Lift.....J210
 28-p. bulletin describes hand lift trucks in capacities from 1,000 to 15,000 lbs., together with close-up views illustrating advanced mechanical features of the company's single stroke hand lift trucks. Bulletin 4883, Barrett-Cravens Co.

Refractory Castables, Plastics.....J211
 Bulletin on wide range of refractory materials describes the products, outlines their characteristics, and indicates typical applications. Bulletin R-22, 18 pp., Babcock and Wilcox Co.

Locomotives for Switching.....J212
 "Switching Power that Saves" describes standard diesel-electric locomotives for industrial switching, and five ways to lower costs in switching. Bulletin GEA-5183, 12 pp., General Electric Co.

Alloy, Corrosion-Resistant.....J213
 Bulletin analyzes Esco Alloy 20 for service against sulfuric acid corrosion. 4 pp., Electric Steel Foundry.

Steel, Chrome-Nickel Stainless.....J214*
 "Handbook for the Fabricator" covers chrome-nickel stainless steel sheets and plates; illustrations of applications in diverse fields; description, analysis, and other data on chrome-nickel steels; and description of their processing and fabrication. 128 pp., Eastern Stainless Steel Corp.

Laboratory Equipment.....J215
 Bulletin No. 4 describes spectrophotometer, washer, burner, stirrers, etc. 7 pp., Harshaw Scientific Co.

Mill, Hammer.....J216
 Bulletins CG-948 and CGD-948 illustrate construction details and features of new hammer-mill, with photographs and drawings. Sprout-Waldron.

Conveyors.....J217
 7-p. bulletin illustrates basic parts of a Chain-O-Flex system, a chain conveyor. Chain-O-Flex Corp.

Joint, Swivel.....J218
 Bulletin 4800 describes the Swivlex all-metal swivel joint. 2 pp., Seamlex Co., Inc.

Purity Meter.....J219
 Bulletin describes apparatus for making quick check-tests for purity of distilled or demineralized water. Barnstead Still and Sterilizer Co.

Demineralizer.....J220
 Apparatus for production of mineral-free water in small quantities is described in Bulletin No. 120. Barnstead Still and Sterilizer Co.

Miscellaneous

Engineering Services.....J221
 A series of bulletins describes such services available from the company as non-destructive testing and inspection, engineering design, etc. Sam Tour & Co., Inc.

Lyon-Raymond Corp.....J222
 "This is Greene, N. Y., Home of Lyon-Raymond Corporation" describes the company's location, and tells of its employee policies and its varied line of materials handling equipment. 32 pp., Lyon-Raymond Corp.

Penn Metal Corp.....J223*
 A 4-p. brochure outlines a brief history of the firm on the occasion of its 80th anniversary. Penn Metal Corp.

Plant Construction.....J224
 A 50-p. photographic album of plants recently constructed by the company marks its 25th anniversary. Several chemical plants are included. Wigton-Abbott Corp.

Allis-Chalmers.....J225*
 The company's progress in power generation and distribution, metals, coal, construction, research and other fields is described in "Allis-Chalmers Annual Review, 1948". 40 pp.

Frank Foundries Corp.....J226
 "50th Anniversary, Frank Foundries Corp." illustrates the possibility of selecting a type of gray iron to meet the requirements of a product, together with notes on the corporation. 26 pp.

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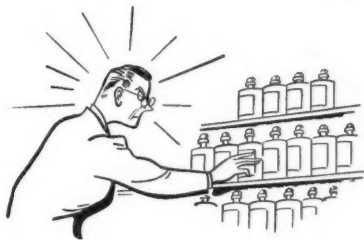
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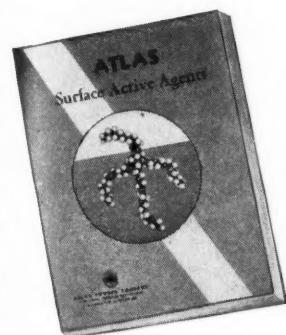
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"Qual" Tests

REAGENTS FOR QUALITATIVE ANALYSIS, Edited by P. E. Wenger and R. Duckert. Elsevier Publishing Company, Inc., New York, 1948; xxii + 379 pp., 60 illustrations, \$7.50. Reviewed by Frederick R. Duke, Iowa State College.

THIS, the second report of the Committee on New Analytical Reactions and Reagents of the International Union of Chemistry, is a selected list of qualitative reagents for sixty cations and thirty-four anions. Both organic and inorganic reagents are included, and an effort has been made to cover a wide range of sensitivity. Thus, although the number of reagents for each ion has been limited to four or the number available, whichever is smaller, the reactions range from spot tests to ordinary test-tube reactions whenever possible for each ion. The reagents used are commercially available or a method of preparation is included.

For each test are given, in order: a bibliography reference; the chemistry of the reaction if known; the details of the test; the sensitivity and selectivity; and the reagents necessary.

In contrast to the uncritically assorted

material in books currently available, the present volume presents carefully selected tests and removes much of the uncertainty concerning what test to use for a particular purpose.

The European literature is well covered up into the present decade. At the time of the selection, much late American literature was unavailable due to war conditions. Therefore, there are certain notable omissions with which Americans are familiar. None the less, the book is a highly recommended addition to any chemist's library.

Chemical Structure

THE STRUCTURE OF MATTER, by F. O. Rice and Edward Teller. John Wiley & Sons, New York, 1949; 361 pp., \$5.50. Reviewed by Joseph O. Hirschfelder, Director, Naval Research Laboratory, University of Wisconsin.

QUANTUM MECHANICS is a very elusive subject and the word "resonance" spells black magic to every chemist. Unfortunately, Pauling and Wilson's "Quantum Mechanics" stops where the real chemical applications begin. Pauling's

"Nature of the Chemical Bond" is too specialized and somewhat out of date and Mott and Sneddon's new book, "Wave Mechanics and Its Applications" gives an excellent summary of mathematical quantum mechanics but is far too technical for all except a few specialists. Therefore, "The Structure of Matter" by Rice and Teller fills a great need.

In this treatise the concepts of quantum mechanics are explained very clearly and these notions are applied qualitatively to a consideration of Van der Waal's forces, chemical bonds, forces in solids, vibrations, electronic spectra, and (last, but not least) nuclear chemistry which is so exceedingly important in connection with all sorts of new developments.

This book should be useful to all chemists, organic or physical, because it clearly presents the reasons behind structure of matter. Only a great master such as Teller and a fine chemist such as Rice could have combined to present such material in such simple, usable form.

Lab Experiments

PHYSICO CHEMICAL EXPERIMENTS, by Robert Livingston. The Macmillan Company, New York, 1948; xiii + 276 pp., \$3.50. Reviewed by Scott E. Wood, Illinois Institute of Technology.

THIS PRESENT book is a revision of the first edition published in 1939. No major changes have been made in the present edition. The discussion of a few topics has been revised or expanded, particularly in the first chapter dealing with errors and the treatment of data. Former experiment 16 dealing with the heats of neutralization and ionization of weak acids has been substituted by an experiment on heats of combustion using a bomb calorimeter. One new experiment on the solubilization by a soap of a water-insoluble dye has been added.

Sulfonamides

THE SULFONAMIDES AND RELATED COMPOUNDS (ACS Monograph No. 106), by E. H. Northey. Reinhold Publ. Corp., New York, 1948; 600 pp., \$12.50. Reviewed by Marvin D. Armstrong, University of Utah.

THIS MONOGRAPH brings together the work of the various fields of science which have gone into the development of the sulfonamides and allied compounds as a potent aid to medicine. It comes at a time when the author may be quoted as saying—"Based on current theories it appears possible that the most effective sulfanilamide derivatives have now been made". The literature has been covered essentially to the end of 1944, and the 600 chemical and 2,100 clinical references have been digested and condensed into tables and summaries in a brief fashion

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which makes for an easy entry into the literature for any problem relating to the sulfonamides.

Chapter one consists of a history of the development of the sulfonamides as chemotherapeutic agents, and the second chapter contains a resumé of the nomenclature and classification of the sulfonamides as well as a general mention of the syntheses for the most common derivatives. Both of these chapters are brief and of general interest.

Chapters three through seven compose the meat of the monograph—they consist of tables of the structures, physical properties, biological activities and references concerning the known sulfanilamide derivatives and related compounds. They ap-

pear to be arranged in a logical fashion such that a reasonable amount of time should suffice to locate a particular derivative or to establish that it had not been made at the time the tables were compiled.

Chapter eight discusses the experimental evaluation of chemotherapeutic activity and would appear to be of interest to the bacteriologist. Chapter nine consists of succinct generalizations on the relationship of structure to chemotherapeutic activity; and chapter ten, on the pharmacology of sulfonamide and sulfone drugs, is mainly of interest to the pharmacologist.

Chapter eleven is entitled Theories of the Mechanism of Action of Sulfonamide

Drugs and deserves especial mention. It considers not only the sulfonamide drugs but covers in a clear and logical manner the development of the entire subject of biological antagonists and theories concerning their mode of action. This chapter might well deserve separate publication in an appropriate journal.

Chapter twelve is concerned with the clinical evaluation of sulfonamide drugs and as such is of interest mainly to the clinician.

An appendix to the monograph includes a table of the trade names, chemical names, and structures of sulfanilamide and related compounds which should be of interest to all concerned with the sulfonamides.

The indexing appears to be adequate but quite brief considering the vast amount of data covered by the monograph.

Working with Vacuum

SCIENTIFIC FOUNDATIONS OF VACUUM TECHNIQUE, by *Saul Dushman*. John Wiley & Sons, Inc., New York, 1949; 882 pp., \$15.00. Reviewed by K. C. D. Hickman, chemical consultant.

THIS book is the most authoritative guide to high vacuum in existence today. It is the culminating expression of a life spent within the sciences that require empty vessels. Dr. Dushman who has been associate director of research in the General Electric laboratory at Schenectady for many years, has witnessed and nurtured or himself created nearly all that is useful in the technology of "dry" vacuums. We use the word dry advisedly to distinguish them from the *wet* vacuums that accommodate distillation, desiccation and polymer chemistry. Neither Dr. Dushman's book nor his experience cover these.

After Langmuir had invented the condensation pump and Knudsen had extended Poiseuille's law to low pressures; and Pirani had invented the hot wire gauge and Dushman and Found the ionization gauge, Dr. Dushman published a little book in 1922, called "High Vacuum" which both presaged and caused a revolution in the technique of creating emptiness. Many other books on vacuum technique followed, but as the sciences involving high vacuum expanded it was apparent that the ultimate compilation still remained to be done. Dushman has produced this in the "Scientific Foundation".

The book is not easy reading but it is authoritative and complete. The first four chapters on the gas laws will both clarify the thinking and provide a reference manual for calculating the admittances of tubes. The sections on pumps and gauges are too full and descriptive to be critically selective. The later chapters on surface phenomena, adsorption, chemisorption, gettering and gaseous

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Carbon Tracers

ISOTOPIC CARBON, by *Melvin Calvin,
Charles Heidelberger, James C. Reid,
Bert M. Tolbert and Peter Yankwich.*
John Wiley & Sons, Inc., New York;
376 pp., \$5.50. Reviewed by W. I.
Thompson, The H. K. Ferguson Co.

LABORATORY workers engaged in
biological or organic chemical studies will
find "Isotopic Carbon" an excellent intro-
duction to tracer techniques as well as
a valuable reference for information which
could be found up to now only in the
general literature. Particular attention
is devoted to experimental modifications
found necessary in tracer work in gen-
eral and required especially in tracer work
with the three useful carbon isotopes,
carbons 11, 13 and 14.

The bulk of the text deals with labo-
ratory techniques with about equal weight
given to methods for isotope detection,
preparation of samples for analysis, and
synthesis and degradation of specific label-
led organic compounds. In addition brief
sections on production and nuclear prop-
erties of the isotopes, applications in
biological research and a generous biblio-
graphy make this book a convenient
starting point for neophytes as well as a
time-saving reference for researchers.

The text is illustrated in the usual text-
book manner with many line drawings and
graphs, and references to original work
are given wherever possible.

It is worth remarking that the litera-
ture in this subject, judged by the biblio-
graphy, dates from about 1940, with the
majority after about 1946. The field is
obviously growing rapidly and it is hoped
that further editions will be able to keep
pace with the development.

Water Determination

AQUAMETRY, by *John Mitchell, Jr., and
Donald Milton Smith.* Interscience
Publishers, Inc., New York, 1948; 401
pp., \$8.00; 53 illustrations, 143 tables.
Reviewed by P. R. Averell, analytical
research chemist, American Cyanamid
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AQUAMETRY is most complete sur-
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ation of water itself, and Part II with the determination of organic functional groups which will take part in reactions involving the liberation or consumption of water—e.g., esterification, or hydration of nitriles. After a brief evaluation of previous methods for the determination of water, an unusual feature is provided: a complete summary, in laboratory manual form for ready reference, of all the procedures using the Karl Fischer reagent. Further on, each procedure is discussed thoroughly with respect to mechanism, scope, interferences, examples, recoveries and precision. The effect of the presence of a large variety of pure organic compounds, commercial materials including foodstuffs, and inorganic compounds, is treated extensively. Alternative procedures are given for handling interfering compounds such as aldehydes, ketones and mercaptans. The different titrimetric techniques are discussed: macro and micro, visual and potentiometric end-points, particularly the "dead-stop" end-point. Organic compounds which can be determined include alcohols, carboxylic acids, acid anhydrides, aldehydes and ketones, amines, nitriles, and organic peroxides besides miscellaneous others.

The liberal use of tables, in which an abundance of data has been systematically collected, augments a well organized text. There are also many diagrams and photo-

graphs of apparatus used by the authors in their own researches, which will be very helpful to users of their methods. The typography is in general excellent, and a minimum of errors are to be found.

"Aquametry" is a very worthy addition to the "Chemical Analysis" series, and should rapidly become a standard reference book in the analytical laboratories of industrial and academic institutions.

Enzymes

THE CHEMISTRY AND TECHNOLOGY OF ENZYMES, by *Henry Tauber*. John Wiley & Sons, Inc., New York, 1949; 550 pp., \$7.50. Reviewed by Gerald Reed, Rohm & Haas Co.

THE PRESENT volume replaces the author's earlier "Enzyme Chemistry" and "Enzyme Technology" (Wiley 1943). Part I deals with the chemistry of the known enzymes, bringing the literature up to the early part of 1947. The chemistry of different enzyme groups is treated extensively and is well documented, while the chapter on classification and kinetics of enzyme reactions is relatively short. This reviewer believes that the author has done well to consider the many aspects of the individual enzymes as completely as possible at the expense of a more systematic, integrative treatise of general enzyme chemistry.

Part II contains chapters dealing with the technology of enzymes principally in the following industries: brewing, baking, alcohol by fermentation, maltose syrup production, dairy products, meat, eggs, vegetables, fruits, wine, medicinals, textile, paper, leather, and tobacco. This section is particularly valuable since no other recent publication deals exhaustively with the subject as a whole although some of the above industries have been covered by extensive monographs.

The chapter on Production of Enzymes using Microorganisms is equally valuable. A similar treatment of the production of enzymes of animal and vegetable sources in separate chapters would have been welcome. This subject is treated shortly in Part I with the chemistry of the individual enzymes.

The excellent chapters on Yeast, Mold Fermentations, Bacterial Fermentations, and particularly those on the production of Antibiotics and Microbiological Methods for the Estimation of Vitamins and Amino Acids need not have been included from the point of view of enzyme technology.


Literature references for Part II are as nearly complete as can be hoped for. They cannot be expected to cover the subject matter as well as those of Part I since scientific publications on enzyme technology are scant and trail industrial practice by many years. Dr. Tauber should be congratulated on his skillful and thorough treatise of the inaccessible material of enzyme technology.

Catalysis

ADVANCES IN CATALYSIS, by *W. G. Frankenburg, V. I. Komarewsky and E. K. Rideal*. Academic Press, Inc., New York, 1948; 321 pp., \$7.80. Reviewed by James H. Boyd, consulting chemical engineer.

THE EDITORS are to be congratulated on their initial volume of an annual series of surveys of catalysis by qualified workers in this field. These annual resumés of published progress will greatly aid the study of catalytic literature. The book is well indexed by author and subject. Differences of opinion among the contributors occasionally arise and are evidence of the need still to regard industrial catalysis as an empirical art. As inferred from the chapter headings for Volume II now in preparation, the subjects included in this first volume will not be discussed in succeeding volumes until substantial progress has occurred in the interval.

Volume I discusses the heterogeneity of catalyst surfaces for chemisorption, surface area measurements, the geometrical factor in catalysis, and the catalytic activation of hydrogen. Of particular interest to petroleum technologists are the chapters on the alkylation of isoparaffins.



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the isomerization of alkanes and the Fischer-Tropsch and related processes for the synthesis of hydrocarbons. The chapter on application of X-ray diffraction to solid catalysts suggests a possibly useful quality control method in catalyst manufacture.

The book is attractively bound and beautifully printed on good paper. The text is enlivened with illustrated tables; graphs and cuts. This book will be a worthwhile addition to the library of any serious worker in catalysis. It is to be hoped succeeding volumes will soon discuss industrial catalysis and catalytic applications of the fluid technique.

Carbohydrates

AN INTRODUCTION TO THE CHEMISTRY OF CARBOHYDRATES, by John Honeyman. Oxford University Press, London, and New York, 1498; 143 pp., \$4.00. Reviewed by R. C. Hockett, Scientific Director, Sugar Research Foundation, Inc.

MR. HONEYMAN, who is lecturer in organic chemistry at King's College, University of London, has succeeded admirably in his undertaking to present a compact and readable introduction to the chemistry of the carbohydrates for persons unfamiliar with the field but acquainted with the elements of aliphatic and aromatic organic chemistry.

By combining skillfully the historical and logical approaches to the subject, he has achieved a simple, straightforward and interesting narrative which should succeed in creating the perspectives necessary for further intelligent pursuit of the subject by individuals working independently. In this narrative, the author moreover has been able to incorporate much information from recent research without leaving his reader ignorant of the classic work of early investigators or yet departing from his policy of reducing details to a minimum.

The eleven brief chapters include seven dealing with the essential chemistry of monosaccharides such as constitution, synthesis, ring structure, reactions with glycol-splitting reagents, action of acids and alkalies, and derivatives. A separate chapter treats ascorbic acid specifically. Two chapters discuss reference compounds useful in elucidating structures of oligo- and polysaccharides and the structure determinations of di-, tri-, and tetrasaccharides respectively, while a single final chapter summarizes all the most important conclusions concerning several polysaccharides.

The bibliographical material is very compressed, being limited to seventy-eight names and the dates (by year) of the discoveries cited, but even these slight references should suffice to guide the reader effectively into literature which might otherwise appear quite overwhelming and chaotic.

The text is well and liberally illustrated by structural formulas and is attractive and accurate typographically.

In a few places the treatment could be improved by further departure from traditional presentation. Unfortunately also, there are several departures from the nomenclature rules recently adopted by the American Chemical Society, which though not yet official for any international body, were informally approved by a number of English workers in the field before recommendation to the American society. An outstanding example is the manner of using the radical name *glucopyranosyl*.

A few minor errors of fact or implication were noted. The book will be welcomed as meeting very competently a need that has often been felt acutely by teachers, students and non-specialists in recent years.

Biochemicals

John Wiley & Sons will publish a new series of annual volumes on the preparation of biochemical compounds to be known as the "Biochemical Preparations" series. Volume I, edited by Herbert E. Carter of the Department of Chemistry, University of Illinois, was published on February 15.

The series will be similar in organization to the well-known Wiley "Organic Syntheses" series and will perform the same function for biochemists as "Organic Syntheses" performs for organic chemists. As in "Organic Syntheses," the preparations in each volume of the new series are subjected to laboratory checks under standard conditions to insure the accuracy of methods presented.

Volume II, scheduled for 1950 publication, is being edited now by Dr. R. R. Sealock. Biochemists are invited to send contributions for the second volume directly to him—at Iowa State College, Ames, Iowa.

Other Publications

PATENT LAW FOR THE EXECUTIVE AND THE ENGINEER, and HOW TO KEEP INVENTION RECORDS are two publications by H. A. Toulmin, Jr. The first, 220 pp., is \$2.95; the second, 100 pp., is \$2.50. Research Press, Inc., Dayton 2, Ohio.

NEWTON PUBLISHING CORP., 114 E. 32 St., New York 16, N. Y., has become sole agent for the Swiss publishing concern, Verlag Birkhauser. A catalog of Swiss books is available on request.

BIBLIOGRAPHY ON X-RAY STRESS ANALYSIS, by Herbert R. Isenburger. \$3.00, St. John X-Ray Laboratory, Califon, N. J.

ANNOTATED BIBLIOGRAPHY ON THE USE OF ORGANOLITHIUM COMPOUNDS. IN ORGANIC SYNTHESIS has been published by Metalloy Corp., Rand Tower, Minneapolis 2, Minn. It is available by letterhead request to research workers in organic chemistry.

THE CHEMICAL PRODUCTION OF LACTIC ACID FROM SUGARS, Scientific Report Series No. 11, and SCIENCE LOOKS AT SUGAR, Fifth Report, are available free of charge from Sugar Research Foundation, Inc., 52 Wall St., New York 5, N. Y. They are distributed overseas at \$0.50 each.

CODING OF THERMOCOUPLE WIRE AND EXTENSION WIRE is a tentative recommended practice published by the Instrument Society of America, 1117 Wolfendale St., Pittsburgh 12, Pa. Free to members, it is \$1.00 to non-members.

MANOMETER TABLES is a similar publication free to members and \$2.00 to non-members.

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NEWS OF THE MONTH

A new expansion program at Spencer Chemical Co.'s Jayhawk Works, Pittsburg, Kansas, will increase its anhydrous ammonia production capacity by an estimated 30,000-40,000 tons annually, and includes plans for slightly increasing methanol capacity. Agricultural uses claim the greater portion of the company's ammonia production in the form of ammonium nitrate fertilizer and ammoniating solutions.

Engineering work on the project has been completed, and contracts for construction have been signed. Chemical Construction Corp., New York, will act as architect engineers on a portion of the project, and construction, to begin as soon as possible, will be carried out by Quaker Valley Contractors, Inc., Pittsburg, Kansas. The tentative completion date is April 1950.

Wyandotte Chemicals Corp., Wyandotte, Mich., has recently acquired approximately 200 acres of land at Dilles Bottom, Ohio, ten miles south of Wheeling, W. Va. Although no immediate construction is contemplated, the new site with a 2300 ft. frontage on the Ohio River, was acquired for future additions to the corporation's organic chemical facilities, and for expansion of its electrolytic chlorine and caustic soda plants.

U. S. Industrial Chemicals, Inc. recently dedicated its new resin plant at Newark, N. J., said to be the largest and most modern resin plant in the world. The company, which constructed the new plant, will start operations immediately.

The plant will manufacture alkyds, maleic resins, pure and modified phenolic resins and ester gums, as well as specialties. It is housed in a five-story brick building, especially constructed for the purpose.

In addition to the new plant, a tank farm consisting of 33 tanks with a combined capacity of 700,000 gallons, is on the property. Processing reactors in the new plant, each of which can produce 6,000-gallon batches of resin solution at a time, are of stainless steel.

Sharp & Dohme Inc. will construct new and larger medical research facilities at its new plant site in West Point, Pa., to replace present research facilities at Glenolden, Pa. Plans for the new building have not been announced, but construction is expected to start this year and be completed early in 1951.

Stepped-up production of carbonyl iron powders to meet the increasing demands of the television industry for high-

frequency core material has been made possible with the leasing of the Carbonyl Iron Power plant of the former Huntsville, Ala., Arsenal, by the Works Division of General Aniline & Film Corp. Production will begin in the near future.

A new company, called the Rust Process Design Co., has been formed to take over the expanding activities of the Process Engineering Division of The Rust Engineering Co., Pittsburgh, Pa. Formation of the new company will facilitate the handling of overall contracts in the fields of chemical processing and refining work.



M. G. Sturrock, appointed manager of development for the Tar Products Division, Koppers Co., Inc. He was formerly director of research and development for the Dominion Tar and Chemical Co., Canada.

Research and development of safety equipment for all industries, including the chemical industry, will be undertaken in a new laboratory, the largest of its kind in the world, to be built at Pittsburgh by Mine Safety Appliances Co. Facilities of the four-story laboratory, which is expected to be completed in September, will be made available to all industry for the investigation of safety equipment problems affecting health and property.

The Philip Carey Manufacturing Co., Cincinnati, Ohio, is erecting a new \$2.7 million plant in Plymouth Meeting, Pa., for the production of magnesia pipe coverings. Hi-Temp insulations, magnesium carbonate and magnesium oxide powders. The new plant will be in the form of one-story buildings, occupying 90,000 square feet of floor space, and is

expected to be completed by the end of this year. Consulting engineers for the project are Knowles Associates of New York City.

Contracts have been let by Abbott Laboratories for the construction of a new branch office and warehouse building in Cincinnati. Measuring 145 by 205 feet, the building will be a one-story structure in modern factory style, offering 22,000 square feet of space. Occupancy is scheduled for early fall.

Chemical companies report the following profits for the past year:

Company	Net Income 1948	After Taxes 1947
Abbott Laboratories and subsidiaries...	\$11,120,983	\$10,216,165
Allied Chemical & Dye Corp.	31,771,204	30,311,484
American-Marietta Co.	1,212,677	1,831,148
American Potash & Chemical Corp. .	1,727,154	2,106,319
Atlas Powder Co. .	1,287,326	2,024,039
Celanese Corp. of America	39,484,000	24,173,417
Commercial Solvents Corp.	5,543,237	9,068,430
The Davison Chemical Corp.	617,000*	1,104,000*
Diamond Alkali Co. and subsidiaries..	5,280,632	4,554,130
Dominion Tar & Chemical Co., Ltd., and subsidiaries..	2,186,950	1,451,299
E. I. du Pont de Nemours & Co. .	157,445,000	120,010,000
Eastman Kodak Co. and subsidiaries..	55,494,425	43,199,254
B. F. Goodrich Co. .	23,740,705	23,231,063
Hercules Powder Co. International Mineral & Chemical Corp.	10,947,062	12,934,430
Industrial Rayon Corp.	1,646,192*	1,230,008*
Koppers Co., Inc. .	12,623,914	13,460,416
Lion Oil Co.	10,552,825	6,165,783
McKesson & Robbins, Inc.	11,722,432	7,991,287
Merek & Co.	4,728,375*	4,756,473*
Mathieson Chemical Corp.	8,520,250	6,379,940
National Lead Co. and subsidiaries..	4,882,812	2,930,565
Pittsburgh Coke & Chemical Co.	13,304,355	12,180,132
Pittsburgh Plate Glass Co.	2,024,515	1,795,339
Sharp & Dohme, Inc. Standard Oil Co. (Indiana) and subsidiaries	32,748,900	27,771,144
Sterling Drug, Inc. .	4,096,200	3,289,754
Texas Gulf Sulphur Co.	140,079,286	94,880,715
Union Carbide and Carbon Corp. and subsidiaries	12,721,610	12,058,903
Victor Chemical Works	24,231,159	21,665,011
*Six months' earnings.	102,335,053	75,666,792
	2,158,736	2,044,384

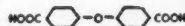
A six-weeks old strike at the Texas City plant of Carbide and Carbon Chemicals Corp. ended last month, when the 1400 hourly employees ratified an agreement made between negotiating committees representing the company and the Galveston Building & Construction Trades Council, A. F. L. Conditions of the settlement included the acceptance of an offer, made prior to the strike, of wage increases for operators and maintenance men, with retroactive pay for hourly

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- 5 tons, NUCCHAR C 115, 4¢ lb.
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employees from September 1, 1948, to the first day of the strike, January 23.

One stipulation of the settlement was that the company retained the right to assign operators to do minor repairs to keep production units running, or when they are down, or in time of emergency.

Ruxton Products, Cincinnati, Ohio, is erecting a new brick and steel plant in suburban Madisonville, for the production of artists' colors. The plant will be 60 by 120 feet in size and is costing approximately \$40,000.

Minneapolis-Honeywell Regulator Co. has entered an agreement for the acquisition of the assets of the H. Belfield Co., manufacturer of control valves. Howard L. Murray, president of Belfield, will be elected a vice-president of Minneapolis-Honeywell and will be in charge of the new acquisition to be known as the Belfield Valve Division of Minneapolis-Honeywell.

Godfrey L. Cabot, Inc., raw materials manufacturers of Boston, has appointed Delacour-Gorrie Limited as its exclusive representatives for the sale of carbon black and pine distillates throughout Canada. P. H. Delacour and F. R. Gorrie recently retired from Harrisons & Crossfield (Canada) Ltd., to form Delacour-Gorrie Limited. The new company will also act as sales agents for General Atlas Carbon Co., Pampa, Tex., subsidiary of Cabot, and producer of Pelletex and Gastex carbon blacks.

The head office of Delacour-Gorrie Limited is at 880 Bay Street, Toronto.

Industrial chemicals will be manufactured by Michelman Chemicals, Inc.,

a new corporation with 250 shares of non-par common stock, which is erecting its plant in Golf Manor, a Cincinnati, Ohio, suburb.

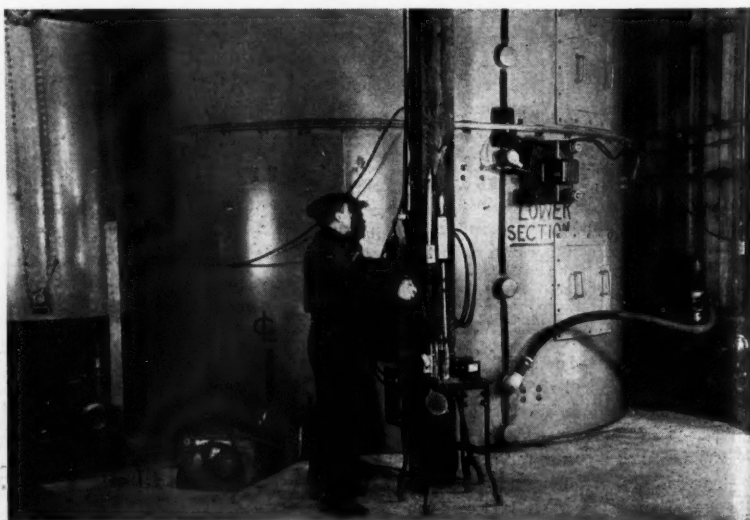
Ohio-Apex, Inc., Nitro, W. Va., recently appointed the following organizations to represent it in their respective areas: Amsco Solvents & Chemicals Co., Cincinnati; Missouri Solvents & Chemicals Co., St. Louis; Ohio Solvents & Chemicals Co., Cleveland; Southern Solvents & Chemicals Co., New Orleans; Hoosier Solvents & Chemicals Co., Indianapolis; Texas Solvents & Chemicals Co., Houston. Each will carry stocks of the company's plasticizers.

Chemical Products Division of The Atlantic Refining Co., has appointed the L. H. Butcher Co. its exclusive West Coast sales representative for packaged chemicals. The major items initially involved will include the Ultrawets, a series of alkyl aryl sulfonates produced by Atlantic.

Sam Tour & Co., Inc., has reorganized its Mechanical Engineering Department under the supervision of John J. Meadows, who has just joined the organization.

Six new research bays have been completed as additions to the Hilton-Davis research establishment at Cincinnati, Ohio, providing six fully equipped laboratories for individual research on color. The project is part of the Hilton-Davis research and development program looking to new and improved products of service to printing ink manufacturers.

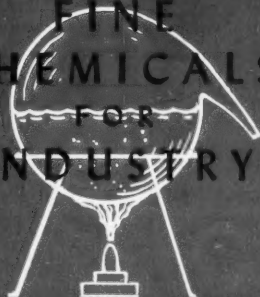
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Lower section of the digester in which industrial, municipal or farm wastes are processed into compost, a natural organic fertilizer, at the Mt. Wolf, Pa. pilot plant of Frazer Products, Inc. Eric Eweson, biochemist, and Joseph A. Frazer, auto manufacturer, are associated in the development.



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U. S. STONEWARE

Since 1865 • Akron, Ohio

trial architect, who resigned in 1947 as chief engineer for the Eastern District of The H. K. Ferguson Co. to enter private practice, has expanded his organization considerably and has moved into new quarters in the Fisk Building, 250 West 57th St., New York City.

The Graphic Arts Group of Sun Chemical Corp., which is comprised of its printing ink and machinery divisions, has moved from 100 Sixth Avenue, New York City, to the Sun Chemical Building, situated at 10th Street and 44th Avenue in Long Island City. This move fulfills a long felt need for centralization.



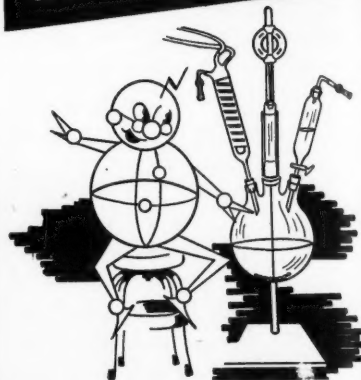
Willard H. Dow, president and general manager of The Dow Chemical Co., who was killed along with his wife Martha and Mrs. Calvin Campbell, wife of the company's general counsel, in a plane crash March 31 near London, Ontario. Mr. Campbell was injured in the accident. Dr. Dow, 52, had headed the company since the death of the founder, his father, Herbert H. Dow, in 1930.

The Wagner Awning & Mfg. Co., Cleveland, Ohio, one of the nation's leading suppliers of industrial canvas products, has been sold to its employees. The company, which specializes in the manufacture of canvas and fabric products to specification, makes filter bags, anode bags, and other fabric products.

Sterling-Winthrop Research Institute will start moving into its new \$3 million laboratory building in June of this year. The four-story, steel-frame brick building is located on a knoll on the east bank of the Hudson River, overlooking the company plants at Rensselaer.

A new local section of the American Chemical Society has been chartered to serve chemists and chemical engineers of a tri-state area embracing seven counties in Alabama, two in Florida, and seven in Mississippi. The new unit which will have its headquarters in Mobile, Ala., will

NEW! NEW! LITHIUM METAL in Convenient Shot Form



METALLOY SCORES ANOTHER FIRST!

Metalloy now offers the most convenient form of Lithium metal thus far developed for organic synthesis—LITHIUM METAL SHOT.

Some research workers find Metalloy Lithium Metal Wire well-suited to their needs. Others prefer finely-divided Metalloy Lithium Metal Sand. Nevertheless, there is a serious need for Lithium Metal in a form having the best qualities of both, particularly for commercial scale reactions.

Metalloy's answer to this need is the new and *revolutionary*—LITHIUM METAL SHOT. In appearance it resembles the shot form of lead and zinc. Its advantages are apparent to all engaged in organic synthesis. It provides sufficient surface for optimum reaction rate. And because it requires a minimum of protective oil, accurate weighing is assured.

In response to users' requests, Metalloy offers Lithium Metal in the following forms:

1. Lump
2. Wire, 1/8" dia.
3. Shot
4. Sand, 60 mesh
5. Rod

Write today for information on:

LITHIUM METAL
LITHIUM HYDRIDE LITHIUM AMIDE

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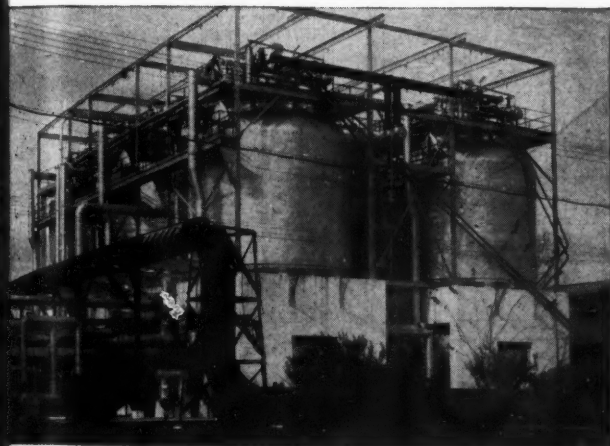
SULPHUR

***Interesting Facts Concerning This Basic Raw Material from the Gulf Coast Region**

***SUPERHEATED WATER . . .**

Mining operations are most successfully carried out if the water pumped


into the sulphur deposit is heated under pressure to a temperature of about 320° F. For large scale mining, enormous quantities of water are required, so, a primary requisite is an adequate supply of suitable water and an efficient power plant in which to heat it.



To insure a continuous supply of water at Newgulf, it is the practice to use river water pumped in time of flood or full flow and stored in large reservoirs. This supply is supplemented, when necessary, with well water. Water so obtained is seldom suitable for use in boilers or mine water heaters without being treated first because of natural salts in solution. Softening by chemical treatment is necessary to prevent deposition of scale on boiler tubes and hot water lines.

Loading operations at one of the huge vats of Sulphur at our Newgulf, Texas mine. Such mountains of Sulphur are constantly being built at our mines, from which shipments are continually made.



TEXAS GULF  SULPHUR CO. INC.
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Mines: Newgulf and Moss Bluff, Texas

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be known as the Mobile-Pensacola Sec-
tion.

CALENDAR of EVENTS

AMERICAN ASSOCIATION OF CEREAL CHEMISTS, annual convention, Statler Hotel, New York City, May 15-19.
AMERICAN CERAMIC SOCIETY, 51st annual meeting, Cincinnati, Ohio, April 24-28.
AMERICAN CHEMICAL SOCIETY, Division of Gas and Fuel Chemistry, symposium, Mellon Institute, Pittsburgh, Pa., May 9-10.
AMERICAN ELECTROPLATERS' SOCIETY, 36th annual convention, Schroeder Hotel, Milwaukee, Wis., June 26-30.
AMERICAN GAS ASSOCIATION, Natural Gas Dept., spring meeting, French Lick Springs Hotel, French Lick, Ind., May 9-10.
AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, regional meeting, Tulsa, Okla., May 8-12.
AMERICAN INSTITUTE OF CHEMISTS, annual meeting, Edgewater Beach Hotel, Chicago, May 6-7.
AMERICAN MANAGEMENT ASSOCIATION, 18th national AMA packaging exposition, Auditorium, Atlantic City, N. J., May 10-13.
AMERICAN OIL CHEMISTS' SOCIETY, annual meeting, Hotel Roosevelt, New Orleans, May 10-12.
AMERICAN PETROLEUM INSTITUTE, Eastern district, William Penn Hotel, Pittsburgh, Pa., April 27-29.
AMERICAN PHARMACEUTICAL ASSOCIATION, annual meeting, Jacksonville, Fla., April 24-30.
ASSOCIATION OF CONSULTING CHEMISTS AND CHEMICAL ENGINEERS, general meeting, Hotel Sheraton, New York City, April 26.
BRITISH INDUSTRIES FAIR, Earl's Court and Olympia, London, May 2-13.
ELECTROCHEMICAL SOCIETY, spring meeting, Benjamin Franklin Hotel, Philadelphia, Pa., May 4-7.
FLAVORING EXTRACT MANUFACTURERS ASSOCIATION, Drake Hotel, Chicago, May 16-18.
FOREST PRODUCTS RESEARCH SOCIETY, 3rd annual national meeting, Civic Auditorium, Grand Rapids, Mich., May 2-4.
INSTRUMENT SOCIETY OF AMERICA, 4th annual spring meeting, Royal York Hotel, Toronto, Canada, May 12-13.
INTERNATIONAL ACETYLENE ASSOCIATION, annual convention, William Penn Hotel, Pittsburgh, Pa., April 25-26.
LIQUEFIED PETROLEUM GAS ASSOCIATION, meeting and trade show, Palmer House, Chicago, May 9-11.
NATIONAL ASSOCIATION OF PURCHASING AGENTS, annual international convention and show, Chicago, June 20-22.
NATIONAL FERTILIZER ASSOCIATION, convention, Greenbrier Hotel, White Sulphur Springs, W. Va., June 13-15.
NATURAL GASOLINE ASSOCIATION OF AMERICA, annual meeting, Texas Hotel, Fort Worth, Tex., April 20-22.
PACKAGING MACHINERY MANUFACTURERS INSTITUTE, semi-annual meeting, Hotel Dennis, Atlantic City, N. J., May 9.
SECOND PACIFIC CHEMICAL EXPOSITION, Civic Auditorium, San Francisco, Nov. 1-5.
SCIENTIFIC APPARATUS MAKERS ASSOCIATION, annual meeting, Atlantic City, N. J., April 25-27.
SOCIETY OF COSMETIC CHEMISTS, spring meeting, Biltmore Hotel, New York City, May 20.
TWENTY-SECOND EXPOSITION OF CHEMICAL INDUSTRIES, Grand Central Palace, New York City, Nov. 28-Dec. 3.

After 80 years at its 81 Maiden Lane, New York, address the Domestic Sales Department of Chas. Pfizer & Co., Inc., has moved to the Brooklyn headquarters of the company, located at 630 Flushing Ave., Brooklyn 6, N.Y.

Industrial Process Engineers has moved into a new and larger plant at 8 Lister Avenue, Newark, N.J. Plant and offices were previously located in West New York, N.J. Coincident with the relocation, I. P. E. has acquired additional modern fabricating and handling equip-

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In your use of chlorine, the location of your source of supply is extremely important in getting delivery that you can count on. DIAMOND's four chlorine plants at strategic locations mean fast, uninterrupted service to most parts of the country. Single unit tank cars are shipped from all four plants; multi-unit tank cars, from all except Pine Bluff; 150-lb. cylinders, from Houston and Painesville only. For a reliable, year 'round source of chlorine, use DIAMOND ALKALI. Consult your nearest DIAMOND Sales Office or write direct.



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Allyl Mercaptan Diallyl Sulfide
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Ammonium Thiosulfate o-Phenylenediamine
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p-Diazo Dimethylaniline Zinc Chloride

Allyl Amine
Phloroglucinol Commercial

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732 Federal Street, Chicago 5, Illinois

FURFURAL

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The lowest priced pure aldehyde available

DESCRIPTION

An amber colored, mobile liquid with a pungent almond-like odor.

TYPICAL ANALYSIS

Specific Gravity (20/20°C).....1.161
Boiling Point, °C, (Todd Still),
744mm.160 (98%)

OTHER PROPERTIES

Freezing Point, °C.....	—36.5
Flash Point (open cup) °C.....	56.8
Refractive Index (n _{25°D}).....	1.5230
Surface Tension at 20°C (dynes/cm)	49.
Viscosity (Centipoises)	
38°C	1.35
54°C	1.09

In addition to properties it possesses

in common with other aldehydes, furfural exhibits a chemical behavior peculiar to the unsaturated furan nucleus. As a consequence it is commanding increasing interest as a chemical intermediate.

Its versatility, its ready availability, its high purity, and its low price are reasons why you should evaluate furfural in processes and products involving its use as a *selective solvent, resin ingredient, general solvent, wetting agent and chemical intermediate.*

Write for Bulletin 201. A few words as to the nature of your interest will enable us to select for you other pertinent literature. Address request to nearest office listed below.



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CHEMICALS DEPT.

In San Francisco, The Griffin Chemical Company • In the United Kingdom, Imperial Chemical Industries Ltd., Billingham, England • In Australia, Swift & Company, Pty. Ltd., Sydney • In Europe, Quaker Oats-Granoprodukten N. V., Rotterdam, The Netherlands; Quaker Oats (France) S. A. 42, Rue Pasquier, Paris 8E, France



Victor Dorkovich, who has joined **R. S. Aries & Associates**, consulting engineers, as a senior associate. He has recently been in charge of the Italian chemical industry for the Allied Military Government.

PERSONNEL

Company Officers

- H. B. Seligman has recently been elected vice president of the Continental Carbon Co. and of the Witco Carbon Co. He has also been made a member of the board of Directors of the latter company. He was formerly treasurer of the Witco Chemical Co.
- E. T. Ladd, vice president and works manager, has been made vice president in charge of the Isco Chemical Division, Innis, Speiden & Co., and C. H. Berle, who was appointed assistant works manager a year ago, has been appointed works manager.
- Thomas E. Sunderland, general counsel of Standard Oil Co. (Indiana), has been elected a director of the company. He fills the position on the board vacant since the death of Buell F. Jones, vice president and general counsel, in November of 1947.
- J. G. MacDermot, manager of the Western Division of Monsanto (Canada) Ltd. at Vancouver, B. C., has been elected a vice president of the company.
- Aaron F. Levy and Edward S. Monahan, have been elected to vice presidencies of Schenley Distillers, Inc., the production division of Schenley Industries, Inc.
- At the annual meeting of stockholders of the American-Marietta Co., the directors who previously served were re-elected and A. King McCord was elected



**CASE STUDY NO. 1:
88 Carloads**

Here's a photographic equipment manufacturer with a systematic metal-salvage program. No more scrap, they said. Yet, after more careful study, they found 88 carloads of heavy iron and steel scrap in a 30-day period!

**CASE STUDY NO. 2:
Metalworking Plant Surprised!**

This big fabricator reported all scrap being turned in. When told needed scrap includes old equipment, not just "production" scrap, they uncovered extra tons of iron and steel.

your
SCRAP

for more
Steel!



**CASE STUDY NO. 3:
Paper Converter Delivers!**

This plant replaced 3000 obsolete machines with new ones. Held old ones for occasional spare parts. Changed mind, scrapped 2800, reduced inventory, got high price for scrap.

SCRAPPY SAYS:
Search your plant
for **HEAVY SCRAP**
... Help make
MORE STEEL!



You, too, may have heavy iron and steel scrap you don't know about. It's the *heavy* scrap that makes the best steel and by processing faster, increases steel output. Appoint one top official of your company to find it. Today, it's dead inventory. Tomorrow, it can be money in the bank. But better than that, it can help to build the one million tons of reserve scrap that we need to increase production for domestic use and for security purposes. Remember—scrap reserves are low, the price of steel scrap is high. Help America and yourself by putting your scrap back to work.



CHEMICAL INDUSTRIES

SULPHUR



A SILENT PARTNER

AMERICAN Industry has a valued "silent partner" in Sulphur, which lends its unique chemical properties to a multitude of industrial processes. For instance, Sulphur is used to help make pulp and paper, rubber, steel, rayon, fertilizer and other necessities—yet seldom appears in the finished product.

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PHOSPHORUS TRICHLORIDE	SODIUM CHLORATE
PHOSPHORUS PENTACHLORIDE	POTASSIUM CHLORATE
PHOSPHORUS PENTASULFIDE	POTASSIUM PERCHLORATE
PHOSPHORUS SESQUISULPHIDE	HYPOPHOSPHITES
AMORPHOUS PHOSPHORUS	OXALIC ACID (Powdered or Crystal)

ZINC PHOSPHIDE

Plant and Main Office:

NIAGARA FALLS, NEW YORK

New York Office:

19 RECTOR ST., NEW YORK 6, N.Y.

to the board. Mr. McCord is a director and first vice president of The Oliver Corp.

Production

• Arthur B. Austin, formerly assistant manager of the Hercules Powder Co. explosives office in Chicago, Ill., has been named manager of the Joplin, Mo. explosives office. He replaces M. W. Latimer, who died suddenly at his home in Joplin, February 23.



Williard D. Peterson, named consultant for Arthur D. Little, Inc. He will consult in the fields of process development, photographic materials, and facsimile duplication.

• E. O. Rhodes has been named a special technical advisor to J. N. Forker, vice president of Koppers Co., Inc., and general manager of its Tar Products Division.

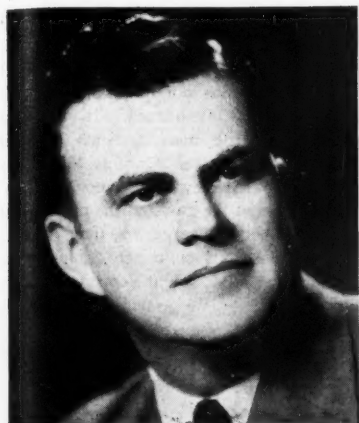
• Max Potash, who was previously associated with the Chemical Division of the Tennessee Valley Authority, and more recently with Publicker Industries, Inc., has joined the staff of the American Polymer Corp., Peabody, Mass. At Peabody, he will have charge of pilot development involving the transition of research projects into production.

• Appointment of David S. Weddell as director of development for Monsanto Chemical Co.'s Western Division, has been announced by Irving C. Smith, recently elected general manager of the division.

Sales

• Alan T. Wolcott has been named manager of advertising and sales promotion, and John A. Grove manager of marketing research for the General Electric Co.'s Chemical Department.

• Elmer W. Metzger has been named director of domestic branches and Don M. Robertson, products marketing manager, Sharp & Dohme, Inc.



Ralph G. Golseth, elected a director of the Glidden Co. He is vice president in charge of the company's Soya Products Division.

• W. N. Wyatt, previously divisional sales manager in charge of solvents and magnesol, Westvaco Chemical Div., Food Machinery and Chemical Corp., has been appointed divisional sales manager in charge of alkalis and chlorine. Don Oskin, previously in charge of alkali sales, has been made divisional sales manager in charge of phosphates, and Arthur F. Smith, divisional sales manager for barium and miscellaneous chemical sales, will also handle solvents and magnesol.

• Synthane Corp. of Oakes, Pa., manufacturer and fabricator of phenolic plastics, has appointed Herbert W. Widdop sales manager, to succeed the late J. B. Rittenhouse.

• William G. Knapp, formerly manager of the Cuban subsidiary, has been named assistant sales manager of Latin American Sales, Sharp & Dohme, Inc. He has been associated with Sharp & Dohme since 1939.

• C. H. Benbrook has been appointed director of research and development of the Ozalid Division of General Aniline & Film Corp. In this capacity, he will also assume full responsibility for quality control of the division's products.

• Edgar Reynolds Smith, chief of the Physical Chemistry Section of the National Bureau of Standards, has received the 1949 Hillebrand Prize of the Washington Section of the American Chemical Society.

Dr. Smith, who prepared the first samples of heavy water, now used by other countries in their atomic piles, was cited for his original work in physical chemistry.

• Emory N. Kemler of New York City, has been named associate director of Southwest Research Institute in Houston.

THE NEW BECKMAN MODEL B Spectrophotometer



26510

The new Beckman Model B is a direct reading, line-operated glass prism Spectrophotometer covering the range 320 to 1000 millimicrons with high resolving power.

Many advances pioneered in the Beckman Quartz and Infrared Spectrophotometers are now offered in this lower priced instrument. It fills the need for a moderately priced instrument designed for rapid, routine analyses and applicable as well to many research problems.

CONVENIENCE: Direct reading wavelength scale . . . 320 to 1000 $m\mu$. Four position sensitivity multiplier. Direct reading absorbance and percent transmission scales. Continuously variable slits. Four position cell carriage.

ACCURACY: Photometric accuracy to 0.5% transmission or 1% absorbance. Stray light effects eliminated between 360 and 1000 $m\mu$. . . less than 1.5% even at 320 $m\mu$. Minimum band width less than 5 $m\mu$ over most of range.

VERSATILITY: Accommodates large cells up to 50 mm path length in standard carrier. Interchangeable red or blue-sensitive photocells. Monochromatic light beam can be brought outside instrument for long path measurements. Easily attached accessories will be available.

26510—SPECTROPHOTOMETER, Glass Prism, Beckman Model "B". Consisting of monochromator with glass prism and slits; blue-sensitive phototube (range 320 to 700 $m\mu$); cell carrier with cells; 6 volt tungsten lamp; and voltage stabilized amplifier for operation on 115 volts, 60 cycle A.C. . . . **\$585.00**

For Technical Literature on the Model B Spectrophotometer: Write, Teletype, Wire or Phone Dept. CI-4 our Nearest Office-Warehouse



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CHEMICAL SPECIALTIES

A department devoted to news of the chemical specialties field. Descriptions of new specialty products will be found in the New Products & Processes department.

Fire Retardant Wins Approval

Monsanto Chemical Co.'s "Rezgard A" has been approved as a flame retardant finish for cotton and viscose rayon by the New York City Board of Standards and Appeals. Fabrics treated with Rezgard A passed tests conducted by the Better Fabrics Testing Bureau made under the board requirements for determination of fire resistance.

Rezgard A, an inexpensive white crystalline powder of the phosphate type, is applied to fabric in the mill. The cloth is immersed in a bath containing the flame retardant, squeezed through rolls and then dried.

Minnesota Mining Plant In Production

Production at the former Plancor plant No. 80 at Bristol, Pa., was started recently by the Minnesota Mining & Manufacturing Co. The 3M company purchased the plant last summer from the War Assets Administration.

First production will be adhesives and coatings. Other lines, including some adhesive tapes, will go into production about May 1. Ultimately the plant will employ about 350 workers.

Shell Consolidates Agricultural Marketing

A new agricultural department has been formed to consolidate the marketing of all Shell Oil and Shell Chemical agricultural products. The expanded agricultural unit now becomes a department of Shell Chemical Corp., with administrative offices in New York City. It will direct national sales of anhydrous ammonia, ammonium sulfate, soil fumigants, insecticides and herbicides.

The decision to merge similar activities of the two corporations into a single agency, handling a complete line of agricultural products, will result in distinct marketing advantages. Among the chief objectives of the change are improved customer service and greater specialization. By eliminating parallel marketing efforts, it is also expected to result in a more comprehensive sales program which will introduce scientific agricultural methods into larger areas of the country.

During the past ten years Shell Oil Company has manufactured and marketed a variety of insecticides for farm use and since the war has developed a number of weed killers and plant hormones to regu-

late plant growth. Sale of these items has been handled by the company's Special Products Department.

Innis, Speiden Offers New Greenhouse Aerosol

Innis, Speiden & Co., New York City, is offering a new aerosol insecticide bomb, suitable for use in greenhouses for spot treatments and seed beds. Called the Iscomist Garden Bomb, it contains DDT and Rotenone and will kill most common garden insects. One-half acre of row crops are covered per bomb.

Oronite Introduces Gas Odorant

Oronite Chemical Co. has made an addition to its line of gas odorants, "Oronite LPG Odorant," which is being offered especially for odorizing LP-Gas. Like natural gas, LP-Gas is odorless in its natural state and an odorant is added for public protection, to warn of leaks, before an accumulation of gas may be exploded by an open flame or an accidental spark. A minimum safety factor of at least 5 to 1 is provided by natural gas utilities and as high as 10 to 1 by companies providing LP-Gas service.

Extensive research and field testing work is required for development of a

satisfactory odorant. These compounds are the most intensely odorous chemicals that can be made, but the odor must be of such a nature as not to be objectionable when the gas is burned. It must not saturate textile material such as rugs and draperies. Gas odorants are highly volatile so that they will disperse uniformly throughout the gas, and the purity must be of a high degree so that deposits won't be formed on meters, diaphragms, valves and other minute openings in gas appliances to hinder their proper operation.

Standard Fabric for Detergency Tests

Foster D. Snell, Inc., has available "Standard PSC Soiled Cotton" fabric prepared by a group at Pennsylvania State College. This is a "reagent" for measurement of detergency on which there is a 25-year background of experience. One of the outstanding difficulties with standard soiled fabric in the past has been that the soil became more firmly fixed with time. With this fabric samples stored in the open air have shown no significant change after 10 years of storage.

After soiling, every piece is lightly washed to remove loosely adherent soil and read with the Hunter Reflectometer. It must agree with a reflectance of 27% within a tolerance of $\pm 2\%$. Every tenth swatch is washed in an 8-step washing cycle with neutral soap and soda ash. To be acceptable it must give a soil removal efficiency in terms of brightness regained of $50 \pm 2.5\%$ after five consecutive washes. The swatches are 5 x 12 inches, conforming to a standard of the



Process control men are pictured in class at the first 1949 session of the Ferro Training Course which was recently completed. Sponsored by the Ferro Enamel Corp., Cleveland, this tuition-free two-week course in all phases of process control in porcelain enameling is offered as a service to the industry.

*signposts to
savings for*
**CITRIC ACID
USERS**

Save on shipping expenses
with
CITRIC ACID ANHYDROUS

Save on storage, handling
with
CITRIC ACID ANHYDROUS

*A*nhydrous Citric Acid offers a more economical source of this acid, and at the same time you assure yourself of Pfizer quality. By using Pfizer Citric Acid Anhydrous you benefit from these savings:

First, you save on *shipping expense* because Pfizer Citric Acid Anhydrous contains no water of crystallization, and you pay freight only on the citric acid you buy and not on water! Figures show you pay freight on only 91.42 lbs. of acid instead of the full 100 lbs. of normal U.S.P. Citric Acid. This means over 8½% less on every freight bill!

Second, you save on *storage space and handling charges* because 10 drums of Citric Acid Anhydrous are equivalent to 11 drums of the U.S.P.

acid. This means you eliminate one drum out of every eleven you formerly stored and handled.

Citric Acid Anhydrous is a granular product, identical in purity with the U.S.P. Citric Acid, and differs only in that it contains no water of crystallization.

Solutions prepared with Citric Acid Anhydrous are identical with Citric Acid U.S.P. provided, of course, that you make allowance for the water always present in the U.S.P. acid. And, unlike the U.S.P. Acid, the Citric Acid cannot dry out, thus overcoming any possible variations in the resulting acidity of your solutions. For further details, please inquire of Chas. Pfizer & Co., Inc., 630 Flushing Ave., Brooklyn 6, N. Y.; 211 E. North Water St., Chicago 11, Illinois; 605 Third Street, San Francisco 7, Calif.



PFIZER

Manufacturing Chemists Since 1849

National Bureau of Standards as to desirable size, to permit four fold-overs for reading in the reflectometer. When prepared, the swatches are given consecutive numbers. The unit package for sale consists of 9 consecutively numbered swatches, the tenth of that series having been used for standardization.

Edco Markets Parathion

Edco Corp., Elkton, Md., manufacturers of greenhouse insecticidal and fungicidal aerosols, is producing a 15% wettable Parathion powder, known as Edco 15.

Said to be an economical, easy-to-use

powder, Edco 15 is effective against a wide range of insects. It will be distributed in bulk or will be packaged and labeled in 3 or 4 lb. cans.

Schenley to Make Streptomycin

Schenley Laboratories, Inc., will soon begin large-scale production and marketing of streptomycin. After extensive pilot plant operations the company, a pioneer in the commercial production of penicillin and currently one of the nation's largest manufacturers of this drug, is now completing preparations to start large-scale output of the companion anti-

biotic. Streptomycin is used for treatment of tuberculosis, certain urinary infections and some types of meningitis and influenza.

The manufacturing facilities established to produce streptomycin are at the Schenley Laboratories plant at Lawrenceburg, Ind. The product will be marketed through the company's regular wholesale channels.



Earl C. Helfrick, appointed central zone manager of the Agricultural Chemicals Division, Sherwin-Williams Co. He joined the company in 1929.

New Penicillin Tablets

Sharp and Dohme, Inc., has released on a national scale "Penalev" tablets, a new and more convenient dosage form of penicillin for inhalation therapy, sublingual administration, oral use in pediatrics, and use in prescription compounding. Providing 50,000 units of penicillin free of excipients and binders, these tablets are readily dissolved in water, salt solution, milk formulas and saliva. The tablets are stable, require no refrigeration and retain their potency at room temperature for 36 months.

Markets Fluorescent Dye For Laundries

Beach Soap Co., Lawrence, Mass., is marketing a fluorescent dye called Fluorium to commercial laundries. This cream-white powder has the property of making goods whiter by transforming invisible ultra-violet light present in daylight to visible light. No change in laundering formula nor in the use of other laundry agents is necessary. However, some laundries have found that they can use less bleach and blue and still get superior results with this product.

New Permanent Starch

Gordon Chemical Co., Inc., Philadelphia, Pa., is manufacturing a newly-developed "permanent" type laundry starch called Plasta-Starch. At present it is being marketed on the East Coast from Maine to Richmond, Va., but national

CAMPHOR

U · S · P

★ Powder

★ Tablets

Chemical Division
McKESSON & ROBBINS INC.
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★ Offices in All Principal Cities ★

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GUM ARABIC BLEACHED
GUM GHATTI
GUM KARAYA (Indian)
GUM TRAGACANTH
GUM EGYPTIAN
GUM LOCUST (Carob Flour)
QUINCE SEED
★
CASEIN

SPECIALTIES:

MENTHOL (Crystals)
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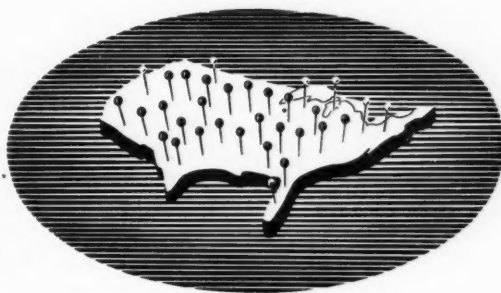
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This liquid product, which is said to withstand as many as eight launderings, is a clear water emulsion of vinyl acetate and acrylic base resins. The resin penetrates the material and coats the fibers with a protective coating that resists wear. A quart retails at 69 cents.

Merck Markets Vitamin B12

Crystalline vitamin B12, used to treat pernicious anemia, is being marketed by Merck & Co., Inc. Isolation of the new vitamin, which will be sold under the Merck trademark of "Cobione", was announced last spring by five Merck scientists.

Cobione is being marketed in ampuls for administration by physicians. Each ampul contains 10 micrograms of crystalline vitamin B12 in saline solution. Cobione is the first vitamin known to contain the metal cobalt. It is now produced through fermentation.

Monsanto Increases TSPP Capacity

Monsanto Chemical Co. has enlarged its facilities for the production of tetrasodium pyrophosphate, in demand as an ingredient of "built" soaps and detergents.

Recently completed additional furnace capacity at the company's Monsanto, Tenn. plant for the production of elemental phosphorus is in full and successful operation. This has enabled the company to divert more phosphoric acid to the manufacture of tetrasodium pyrophosphate. In addition to its use in soaps and synthetic detergents, this product finds application in textile processing, cleaning compounds, and conditioning oil well drilling muds.

New Floor Covering Developed by Hood

A new resilient rubber-backed floor covering with a simulated broadloom design surface has been developed by Hood Rubber Co., a division of B. F. Goodrich, for use where carpeting is difficult to maintain.

The new product, called Hood Arrazin Carpet, is being produced in five colors and three thicknesses. Although heavy-duty carpeting, it has the appearance of broadloom. The tough, long-wearing, embossed surface is made from Geon resins, with cushioning provided by a cellular rubber base.

The floor covering has been tested for a year in trains, airplanes, elevators and other places where heavy pedestrian traffic, noiselessness, foot comfort and

ease of maintenance are important considerations.

G. E. Institutes New Inventory Price Policy

In a move to protect the paint industry from loss of raw material inventory values in event of future price declines, the General Electric Co.'s Chemical Department has instituted a new inventory price protection policy for its Glyptal alkyds.

Under the new written policy, customers are protected for all Glyptal alkyd resins in stock for a period of 45 days after shipment by the company. In the event of a price reduction, G. E. will refund the difference between the original selling price and the new price.

Plastic Bladders for Sports Inflatables

Plextron, Inc., New York City, is offering a complete line of plastic bladders for footballs, basketballs and other sports inflatables at prices considerably lower than those prevailing for traditional rubber bladders.

Plex-Tite bladders are fabricated from Bakelite's Vinylite sheeting whose abrasion resistance, tensile strength, and air retention makes it ideal for the purpose.

(Turn to page 683)



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	SPECIFICATIONS		Typical Analysis
	Max.	Min.	
Specific Gravity at 15.5/15.5°C	0.875	0.860	.861
Refractive Index at 20°C	1.478	1.465	1.466
Unpolymerized Residue (38N-H ₂ SO ₄)	2.0%		0.8%
Distillation:			
Initial Boiling Point	160°C	150°C	154°C
Distilling below 170°C		90%	95%

PROPERTIES

Flash Point: Approximately 98°F. (Tag open cup).

Optical Rotation Above +25°.

Solvent Power: (Kauri Butanol): Approximately 57 ml.

(Aniline Point): Approximately 18°C.

(Mixed Aniline Point): Approximately 44°C.

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Code Word: TURPS.

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Tank Cars: 6000 and 8000 gallons.

Compartment Cars 3 x 2000 gallons.

Drums: 55-gallon galvanized drums, net weight, 396 lbs: (Gross weight approximately 450 lbs.)

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CHEMICAL MARKETS

Lead, Zinc Prices Cut

Two price cuts in lead and one in zinc brought about the first break in major non-ferrous metals since the OPA ceased to exist in 1946. Lead was reduced 2¢ from 21½¢ a pound record high to 19½¢ a pound at New York, and then further cut within a week to 18¢ a pound, New York. Adjustment of the zinc price, expected as a result of the lead declines, brought down the price of top-grade slab, East St. Louis delivery, to 16¢ a pound, a reduction of 1½¢ from the peak price that had prevailed since Nov. 15.

A sudden change in supply conditions brought about the break in lead. Battery makers, who consume about one-third of the market, have found themselves overstocked because of a slack demand probably occasioned by the mild winter in the east. This, plus availability of heavy imports that had been tied up by the Pacific Coast shipping strike, and a flood of lead scrap, transformed an acute shortage into a surplus. Consumers have been curtailing purchases, reducing inventories or buying on a hand-to-mouth basis, and lead producers are trying to find a price that will stimulate interest. The same situation has prevailed in zinc.

The chemical industry is an important consumer of lead, particularly for tetraethyl lead used in gasoline anti-knock compounds. Both Du Pont and Ethyl Corp., the two producers, followed the lead decline with reductions in the price of anti-knock mixes. Lead pigments, which paint manufacturers have been replacing as much as possible because of

their high price, were also reduced. Other chemicals containing lead, such as leaded zinc oxide and lead acetate, have also followed the downward trend in price.

High Chemical Purchases Under ECA

Chemicals, industrial chemicals and related products procured for foreign aid since a year ago, have run to many millions of U. S. dollars, according to a summary of authorizations now available for the first time.

Since April, 1948, and down to the end of February, the ECA has authorized the following procurement under these heads: chemicals and related products, \$122,486,000; industrial chemicals, \$34,463,000; alcohol, \$10,005,000; other chemicals and related products not specified, \$62,377,000; pesticides, \$718,000.

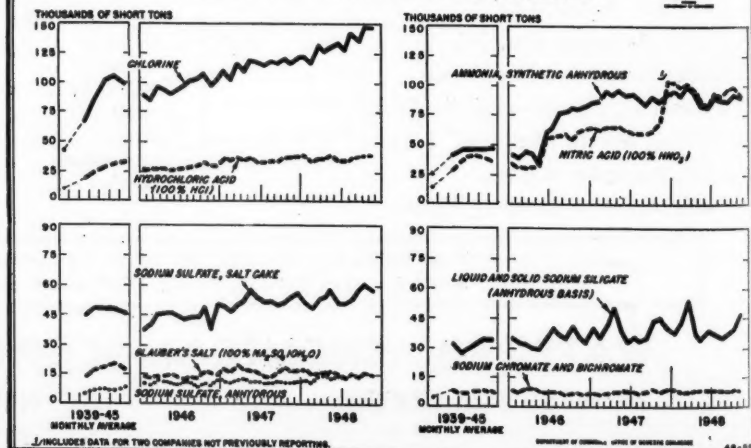
Natural Glycerine Cut To Synthetic Level

Price of refined natural glycerine has been cut 15 cents a pound in the first reduction since late 1947. With the new price, the natural material is approximately competitive with synthetic glycerine that has been available only since Shell Chemical Co. began production recently at Houston, Tex.

Major reason for the cut in price has been the continued decline in the prices of fats and oils going into soap production, of which natural glycerine is a by-product. Increased production has been advanced as another factor.

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mated at less than one-fifth that of the natural, and there does not seem to have been any offered in the open market. Reportedly it is going directly to consumers at a price of 22.33 cents a pound, f.o.b. Houston. The new price for chemically pure refined natural glycerine is 24½¢ a pound, and for dynamite glycerine, 23½¢ a pound. At the same time, crude natural glycerine was reduced 6¾ cents a pound. Increased market interest followed these reductions.

Major consumers of glycerine who will be affected by the price change are synthetic resin manufacturers. It also is an important material for explosives, tobacco, cosmetics and cellophane.

Price Cuts Reflect Coal Slump

A cut of 15 to 40 cents a ton by Pittsburgh Consolidation Coal on its contract quotations for northern West Virginia industrial coal brought to light a situation that has existed since late last summer. Slackened industrial activity and the mild winter have cut demand, caused reduced work-weeks, and built up huge stockpiles—estimated as high as 80 million tons, of soft coal. Consumers have gone to spot markets for their purchases, saving as much as 30 per cent on their energy bills.

This of course has brought great pressure for adjustments of contracts (usually for one year), and larger companies have had to meet these prices.

Price cuts of 10 to 25 cents a ton have been made on soft coal to be shipped by various western Pennsylvania producers on contracts for the next year, and other reductions are being negotiated.

The recent mine work stoppage was felt by many to be an attempt by the United Mine Workers (whose financial strength depends on a prosperous coal industry) to stabilize the industry by reduction of stocks. This was expected to give demand a shot in the arm, and support prices. However, stocks were reduced only to an estimated 55 million tons, still above normal for this time of year.

Lower coal prices are of greatest importance to chemical companies from the standpoint of fuel costs since the cost of coal is a minor factor in production costs of coal chemicals.

Lower Support Price For Naval Stores

The government support price for naval stores has been reduced from \$131.58 to \$99.89 per unit for the 1949 crop. A

(Turn to page 683)

Market Review

Although the market was free of spectacular alcohol changes, solvents continued to draw attention. General belief was that alcohol had hit bottom at 21¢ a gallon for the pure material, but there were reports of shadings of particular formulas. Distillers who hoped to buy Cuban molasses at 2¢ will probably be disappointed since a large sale at 4¢ a gallon f.o.b. Cuba was reported. It was felt that with this as a raw material price, distillers will have to sell at higher than 21¢.

This generally unsettled tone prevailed throughout solvents. Because of large inventories, butyl alcohol and butyl acetate were reduced 2½¢ a pound to 15¢ a pound in tankcars. The plasticizer dibutyl phthalate followed these down by a drop of 1½¢ to a price of 30½¢ a pound in tankcars. Secondary butyl acetate was at 11½¢ in tankcars after a reduction of 1½¢ a pound. Sales well below the quoted price indicated that ethylene dichloride is harder to move. Sales at 5.5¢ a pound, and offers as low as 4¢ have been made.

A spotty demand prevailed for heavy chemicals as improved supplies sent manufacturers in search of export orders. The reduction in lead had its effect: Leaded zinc oxide (35 and 50% grades) was reduced, and an ad-

justment in lead acetate of \$1.75 a cwt. reduced it to \$26 for the granular and powdered grades. Ammonium chloride and zinc ammonium chloride were advanced to \$7 and \$7.50 a cwt. respectively. Saltcake was reported shaded as much as \$2 from its \$27-a-ton price.

Lead pigments owed the first reduction in over 2½ years to the drop in the price of lead. All these pigments were quoted at about 2¢ a pound less, but this was not expected to affect mixed paint prices. Titanium pigments at least seemed to be in balanced supply.

Delayed and selective purchasing by agricultural people indicated that mixed or complete fertilizer consumption would be off as much as 10 per cent from last season. There also seemed to be more interest in copper fungicides.

Demand for fine chemicals ran low, and the price trend was down. All grades of penicillin were reduced to the lowest level since it became available, as the price in vials dropped to 22¢ for 100,000 units. As a result of this competitive situation, a major producer reduced the bulk price, making procaine and sodium penicillin 7¢ to 8¢ per 100,000 units, and the potassium crystalline material 6¾-7¾¢.

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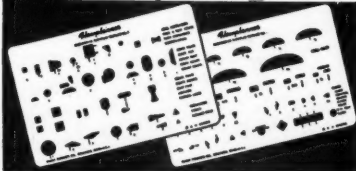
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RUG CLEANERS

(Continued)

be evaluated. Resoil may be evaluated by padding a small piece of rug, say 6 x 9 inches, in a 3% solution of detergent under test, then passing it through a pair of squeeze rolls to give a wet pickup of about 100%. The piece can then be left to air dry and inserted into a hole cut from a scatter rug and the assembly then laid on the floor for a sufficiently long period of time to note visual differences in soil pickup.

Detergency is the hardest factor to determine. It can be done visually by comparison of color before and after cleaning and also by solvent extractable analysis to cover removal of the oily component of foreign matter. Total foreign matter analysis may be made by ash testing under the proper conditions or by shaking out and weighing loose foreign matter before and after cleaning to note the extent of removal.

MARKET POTENTIAL

It is estimated that the rug cleaning industry in this country does a gross business of \$40 million a year. Of this amount, detergents represent a small but very important investment. The total market for detergents in the rug cleaning industry is in the neighborhood of 1% of their gross business or \$400,000 per year.

The rug cleaning industry has by no means exploited its trade to the limit of its potentialities. Only a minor fraction of all rugs sold are ever cleaned. An educational policy on the maintenance of floor coverings is tending to increase that fraction and it appears that the potential rug cleaning business is about four times as great as the amount which has been achieved. Should this trend continue, the market for detergents in the rug cleaning business will increase markedly.

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Chemical Markets

(Continued from page 676)

gum naval stores production unit is 50 gallons of turpentine and 1,400 pounds of N-grade rosin. The per-unit support level remains constant through the loan period, but the individual loan rates for turpentine and rosin can be revised from time to time as market conditions require it. The initial support rates are 40 cents per gallon for turpentine, bulk, and \$5.71 per 100 pounds, net, on N-rosin.

Reaction in the gum rosin industry to the lower rates is mixed, with many feeling that it may signal healthier times for them. It will put gum rosin in a much better competitive position with wood rosin, which undersold it last year. Instead of moving into government loan storage, more gum rosin will move out into consuming channels. It should also stimulate interest by Western European countries since the newer prices will allow the American product to compete with Portuguese and Spanish rosin.

Sulfur Production Holds Record Level

The domestic sulfur industry produced 438,527 long tons of native sulfur during December to set a new record for a month's production, according to reports to the Bureau of Mines. Total production for the year 1948, was 4,869,211 long tons, which was also a record—exceeding by nearly 10 percent the previous record year of 1947.

Producers held stocks of 3,225,014 long tons at the end of the year—a decrease of less than 5 percent from stocks at the beginning of 1948.

Correction

In the Chemical Markets section of the February issue it was erroneously stated that methanol has a higher boiling

point than ethanol which gives it an advantage as an automobile anti-freeze base. The reverse is true. The principal reason for the popularity of methanol in this field has been the price advantage it enjoyed prior to the recent break in ethanol prices.

Chemical Specialties

(Continued from page 672)

DDT and Chlordane Safe for Bakeries

Use of such potent poisons as DDT and chlordane in bakeries to repel insect invaders was upheld by Dr. Edward L. Holmes of the American Institute of Baking at the 115th national meeting of the American Chemical Society in San Francisco. He said that objections to these insecticides, based on the possibility that they might contaminate bakery products, have been proved unfounded, and when proper precautions are taken there is no danger of food poisoning.

It was further stated that there is far less danger from contamination with residual sprays of the DDT and chlordane types than there has been in the past usage of other poisons such as sodium fluoride powders which were employed for many years without any particular adverse publicity, despite infrequent food poisonings resulting from their use.

New Insecticides for Grasshopper Control

Many farmers are now using sprays or dusts containing new organic insecticides for grasshopper control instead of broadcasting bran-sawdust-sodium fluosilicate bait. Of the various new chemicals that have been thoroughly tested, chlordane and toxaphene have performed the best.

These new insecticides give quicker and better initial control and continue to

kill longer than the standard sodium fluosilicate bait. They are particularly effective when applied as sprays or dusts on succulent growth along roadsides, railroad right-of-ways, canal banks, and field margins, or to such crops as rank-growing alfalfa, young cotton, or corn.

Chlordane and toxaphene applied as sprays give higher initial kills, and continue to kill over a longer period than equal dosages of dusts. When using sprays, 1 pound of technical chlordane or 1½ pounds of technical toxaphene per acre is recommended. When using dusts, 1½ pounds of technical chlordane or 2 pounds of technical toxaphene per acre should be applied.

These dosages have given high initial kills and residual action lasting 1 to 3 weeks under a wide variety of conditions.

CO Cartridge for Rodent Control

Development of an improved carbon-monoxide producing cartridge for the control of woodchucks, prairie dogs and other types of rodents is the subject of a Government report now available.

The most promising design, developed by the Chemical Corps in cooperation with the Fish and Wildlife Service, is a paper cartridge, 3½ or 5 inches long, and 1½ inches in diameter, containing a mixture of 65 percent sodium nitrate and 35 percent of a specific type of carbon black. The cartridge is inserted and ignited in a closed burrow inhabited by rodents.

This type of extermination is considered more effective than the use of poison compounds, and cartridges of similar though less effective design have been recommended by the Fish and Wildlife Service for some time.

The report, PB 96224, *Rodenticide Cartridge—Pyrotechnical Production of Carbon Monoxide* is available at \$5.00 in photostat form, \$2.25 in microfilm, from the Library of Congress.

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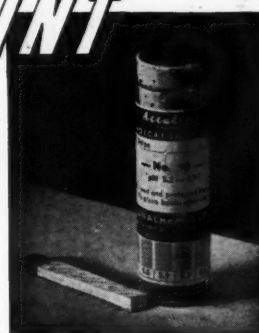
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WALL THICKNESS

(Continued from page 580)

conductivity of the wall itself. Essentially, the device consists of (1) a *four-electrode probe*, with a holder and connecting cable, (2) a *microvoltmeter* and (3) a *power supply* with adjustable amperage.

In operation, the probe is placed upon the material to be tested with a force of fifteen pounds and a known electric current is passed between two adjacent electrodes of the four in the probe. The resistance of the circuit thus formed with the material varies inversely with the cross-sectional area, so that the potential drop in the plate between the other two electrodes depends upon the electrode spacing and the thickness of the material. Two different sets of electrode spacings are used with spacings at a fixed ratio, and the two values of potential thus obtained are expressed as a ratio which is a function of the plate thickness.

Actual thickness values are obtained from a plotted curve of this ratio versus wall thickness.

Operation of this equipment is said to be rather slow and surfaces must be perfectly clean before the electrode probe is used. Also, a second operator is needed to assist in making the two readings of microvoltage drop.

The method is apparently limited to relatively flat surfaces, but is said to have an accuracy of plus or minus 3 per cent.

ACKNOWLEDGMENTS

The author is indebted to the following manufacturers of measuring instruments for their assistance:

1. Branson Instruments, Inc., Joe's Hill Road, Danbury, Conn.
2. Ford Motor Co., 3000 Schaefer St., Dearborn, Mich.
3. General Electric Co., 1 River Road, Schenectady, N. Y.
4. Instruments, Inc., Wright Building, Tulsa, Okla.
5. Magnaflux Corp., 5900 Northwest Highway, Chicago, Ill.
6. Shell Development Co., 50 West 50th St., New York, N. Y.

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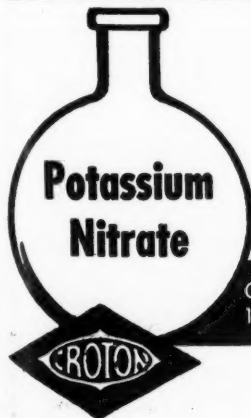


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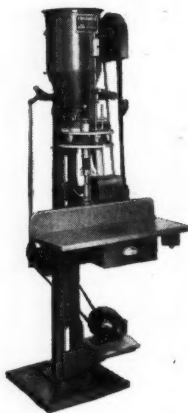
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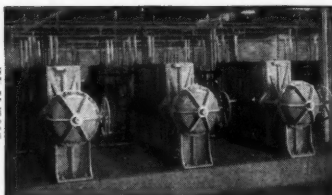
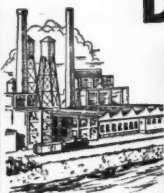
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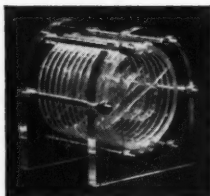
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FROM WHERE WE SIT

by "DOC"

IN THE OLD DAYS, when men took their names from their occupations rather than from their fathers, it was probably easier than nowadays to find a Mr. Smith who was a blacksmith, a Mr. Miller who owned a mill, or a Mr. Wainwright who wrought wains. We waxed joyful, therefore when we came across a contemporary example of this fine old custom in the program of the recent A.C.S. meeting in San Francisco: One of the co-authors of a paper entitled "Ion Migration in Agar Gels" was a Miss Hilda Agar.



EUGENE AYRES, of Gulf Research and Development Co., seeing an inevitable end to our "fossil fuels," recently told us where our continuous energy is coming from before another century will have passed: solar power will provide half; vegetation, a quarter; waterfalls, a seventh; and solar space heating, a tenth.

Fine, we thought, and nodded our head in acceptance. Since, though, a small, insistent question has been plaguing us night and day: Where is the other one hundred-and-fortieth coming from?



AFTER MORE YEARS behind our desk than we'd care to count, we're not surprised, alarmed, pained or shocked at anything—well, hardly anything—that arrives in the morning mail. Yesterday brought an item, though, that has left us—accustomed as we are to deal with the cold, hard facts of chemical life—with glassy eyes, a throbbing pulse, and a slight constriction in our bosom:

"How sweet is a kiss?

"If the lady is wearing lipstick, the chances are that it is just as sweet as sugar. The reason is the use of powdered saccharin . . . to give the affectionate greeting that tasteful zip.

"Although tastes vary, Ray F. Caulk, of Monsanto Chemical Company . . . says that about one two-hundredth of a gram in each lipstick does the trick for most people.

"A lipstick, incidentally, weighs only 3.2 grams. But whether it be Magenta Moonlight, Purple Sigh or Vibrant Passion, it packs an oversized wallop in each gram.

"And the world agrees that, movie star or bobby-soxer, a kiss is just as sweet."

FIFTEEN YEARS AGO

(From Our Files of April, 1934)

The Wagner Bill, which provides among other things that no employee be required to join a company union, is meeting stiff opposition from industrial leaders. William B. Bell, president of the Manufacturing Chemists' Association, and of American Cyanamid, was elected spokesman for 200 companies, and he stated before the Senate Labor Committee that the bill would not aid recovery and would promote further labor unrest.

Sulfuric and nitric acids are simultaneously produced in a French process by passing pre-cooled sulfurous and nitrous gases of low-water content together through an absorption system co-current with a liquor containing sulfuric and nitrosyl sulfuric acids. Concentrated liquor so obtained is denitrated by heat and water.

John Hay Whitney, still in his late 20s, has been elected chairman of the board of Freeport Texas, the 2nd largest sulfur producing company in this country.

Hitler has abolished the Reich Potash Council (formed in 1919) and has formulated drastic laws to reorganize the industry along National Socialistic principles. The main effect is to nationalize the industry further.

The Drug and Chemical Section of the New York Board of Trade had a record attendance at its recent press luncheon. Postmaster James A. Farley spoke in defense of the New Deal.

THIRTY YEARS AGO

(From Our Files of April, 1919)

A fuel substitute for gasoline has been discovered by M. C. Whitaker. It has been patented under the name of "alcogas".

A Dye Division of the American Chemical Society has been formed with the object of making the United States independent of German dyestuffs.

One hundred and fifty employees of Heyden Chemical Co. have gone on strike. They demand a 48-hour week and a 10% wage increase.

THERE'S NO DOUBT about it. The boys who turn out the advertising copy have cocked an ear to the Voices of Spring. Down at Hercules Powder Co. one of the Muses-Thalia, we believe, in this case, while Erato was lurking around Monsanto—decended on someone's shoulder and inspired an ode (with illustrations) starkly entitled "Toxaphene. Kills Grasshoppers":

A's for Antenna, navigational "must",

First part affected by toxaphene dust.

B is for Belly, now touching the ground,

With appetite gone and legs quite unsound.

C is for Cramps toxaphene quickly brings;

Stops 'hoppers advancing with legs or with wings.

D's for Digestion, now sadly N. G.

Partly evident here, but just wait and see.

E is for Evidence toxaphene works quick

Now ganglia and thorax feel its lethal kick.

F is for Face with ravenous maw,
But no longer a menace with paralyzed jaw.

G is for ghost of a bug once well fed,
But a toxaphene diet will soon see him dead.

H Stands for 'Hoppers. They'll never be seen

If you guard your crops with approved* toxaphene.

This alphabet ends at this point we fear.
No more words are needed to make our case clear:

Toxaphene kills grasshoppers!

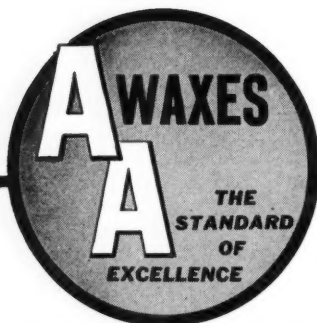
* Recommended by USDA.



WELL, THAT WINDS UP this month's lesson in Contemporary English Literature. We now feel constrained to point out a glaring example of American imperialism: "In the U. S. 1,000 million is called a billion and 1,000 billion a trillion, but in Great Britain a 'billion' is a million millions, and a 'trillion' is a million 'billions.' In the hope of reconciling this difference, the [International] Conference [on Weights and Measures] adopted a recommendation favoring the use of six-digit groups; but, since the U. S. representatives could not agree to such a recommendation, the resolution as adopted proposed the use of that particular system in European countries."

We can't help wondering—If the world can't agree on the meaning of "billion," how can it ever agree on the meaning of more important (to everyone) words like "freedom" or "rights," or "treason," or "democracy"?

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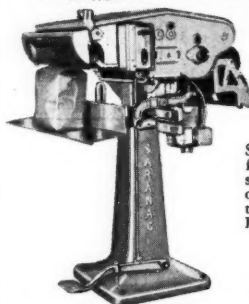
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U. S. Patents from Official Gazette—Vol. 618, Nos. 1, 2, 3, 4; Vol. 619, No. 1 (Jan. 4-Feb. 1)
Canadian Patents Granted and Published Jan. 4-Feb. 1

Inorganic

In the production of hydrogen peroxide by first hydrogenating an alkylated anthraquinone and then oxidizing the resulting hydroquinones with the formation of hydrogen peroxide and regeneration of the quinones, the improvement which comprises employing dibutyl sebacate as a solvent. No. 2,455,238. Lynn H. Dawsey, Robert R. Umhoefer and Carl R. Muehlhauser (to Buffalo Electro-Chemical Co., Inc.).

Agglomerate of rhombohedral alumina which comprises forming a binder by reacting a mixture of magnesium chloride, alumina hydrate, phosphoric acid, sodium silicate, water, silica gel and boric anhydride. No. 2,455,358. Vladimir Diterichs (to Attorney General of the U. S.).

Cleaning iron by reacting in an acid bath composed of nitric acid, muriatic acid, sulphuric acid, hydrogen sulphide, sodium acetate and a compound from the group consisting of potassium hydrogen phosphate (K_2HPO_4) and potassium ortho phosphate (K_3PO_4). No. 2,455,411. Francisco Ambrosio Ricardo Franchi.

Calcium phosphate phosphor. No. 2,455,413. Herman C. Froelich and Joseph M. Margolis (to General Electric Co.).

Aluminum phosphate phosphor. No. 2,455,414. Herman C. Froelich and Joseph M. Margolis (to General Electric Co.).

Ultraviolet emitting magnesium pyrophosphate phosphor. No. 2,455,415. Herman C. Froelich (to General Electric Co.).

Gel catalyst. No. 2,455,445. Melvin J. See and James C. Bailie (to Standard Oil Co.).

Process for regenerating spent ammoniacal cuprous solution. No. 2,455,473. Josef G. Dely.

Manufacturing potassium tetraborate tetrahydrate by heating and reacting potassium pentaborate and a sodium compound from the group consisting of hydroxide, carbonate and bicarbonate to form sodium and potassium tetraborate, cooling the solution to crystallize borax, removing the crystallized borax and thereafter inducing crystallization of the potassium tetraborate. No. 2,455,595. Frank Henderson May (to American Potash & Chemical Corp.).

Treating aqueous alkaline solutions to obtain commercially pure sulfur compounds which alkaline solutions have been used to extract acidic sulfur compounds from hydrocarbon fluids. No. 2,455,656. Stephen P. Cauley (to Socony-Vacuum Oil Co., Inc.).

Preparing a catalyst for use in a Fischer-Tropsch synthesis by preparing an admixture of an iron oxide and alkali metal ferrate, heating and subsequently contacting with a reducing atmosphere. No. 2,455,696. Max A. Mosesman (to Standard Oil Development Co.).

Preparing a catalyst for hydrogenation of nitro aromatics by forming a mixture of at least one group 6 metal oxygen-containing compounds and a support consisting of alumina and clay, subjecting to a sintering treatment, and heat treating. No. 2,455,713. Alexis Voorhies, Jr. (to Standard Oil Development Co.).

Working up of a magnesite rock and purification of magnesium carbonate. No. 2,455,813. Robert A. Schoenlaub (to Basic Refractories, Inc.).

Mercury treated charcoal catalyst. No. 2,455,881. Leroy Frank Salisbury (to E. I. du Pont de Nemours & Co.).

Preparation of a silica-alumina catalyst. No. 2,456,268. Frank C. Gibbs, Jr., Bruce M. Baird and Robert J. Brosamer (to Phillips Petroleum Co.).

Preparation of supported aluminum chloride catalysts. No. 2,456,326. Walter H. Rupp and Clarke T. Harding (to Standard Oil Development Co.).

Normal metal phosphate material prepared by precipitation from a non-acidic solution of a calcium salt, a nickel salt, and a phosphate. No. 2,456,367. Edgar C. Britton and Andrew J. Dietzler (to Dow Chemical Co.).

Calcium nickel phosphate-chromium oxide catalyst. No. 2,456,368. Edgar C. Britton and Andrew D. Dietzler (to Dow Chemical Co.).

Drying of sodium nitrite to obtain a relatively noncaking granular form. No. 2,456,393. Douglas R. Duncan (to E. I. du Pont de Nemours & Co.).

Manufacture of hydrogen fluoride by contacting a substantially dry gas mixture containing HF and SiF_4 with a fluosulfonic acid. No. 2,456,509. Abner C. Hopkins, Jr., Richard M. Stephenson and William E. Watson (to Allied Chemical & Dye Corp.).

Preparing active surfaces of substantially pure metallic sodium by treating an inert non-porous material with a solution of sodium in liquid ammonia, and evaporating the ammonia. No. 2,456,525. George Alexander Mills (to Houdry Process Corp.).

Stabilizing treatment of inorganic oxide gels against wetting. No. 2,456,576. Ernest A. Bodkin and John W. Payne (to Socony-Vacuum Oil Co., Inc.).

Stabilizing inorganic oxide gels against wetting. No. 2,456,577. Ernest A. Bodkin and John W. Payne (to Socony-Vacuum Oil Co., Inc.).

Stabilizing inorganic oxide gels against wetting. No. 2,456,578. Ernest A. Bodkin and John W. Payne (to Socony-Vacuum Oil Co., Inc.).

Catalyst manufacture by treating an inorganic oxide carrier with a solution of a normally solid aromatic hydrocarbon, and subsequently compositing therewith a metal from group 8 of the periodic table. No. 2,456,633. Vladimir Haensel (to Universal Oil Products Co.).

Preparing a catalyst by forming an acid hydrogel of silica and zirconia, aging, then subjecting the hydrogel to rapid drying. No. 2,456,721. Thomas H. Milliken, Jr., and Irving H. Welinsky (to Houdry Process Corp.).

Aqueous solution for activating the surface of a metal selected from the group consisting of ferrous, zinc, cadmium metals and alloys in which they form the predominant constituent for subsequent reaction with phosphate coating solutions consisting essentially of disodium phosphate combined with at least one water-soluble compound of a metal selected from the group of metals consisting of titanium, zirconium, tin and arsenic, a soap of a fatty acid and an amine and the balance being water. No. 2,456,947. George W. Jernstedt (to Westinghouse Electric Corp.).

Making silicate and germanate phosphor compounds by heating a member of the group consisting of oxides of silicon, and germanium, a member of the group consisting of oxides of zinc, beryllium, calcium, cadmium, magnesium, strontium, and barium, a member of the group consisting of the oxides of tin and lead and a manganese activator in a current of live steam containing entrapped ammonia. No. 2,457,054. Humboldt W. Leverenz (to Radio Corp. of America).

In forming inorganic oxide hydrogels from inorganic oxide hydroxols capable of setting to hydrogels by forming a hydrocol and injecting said hydrocol into a water immiscible liquid as a plurality of globules, the improvement which comprises subjecting said liquid to supersonic vibrations during gelation of said hydrocol. No. 2,457,091. Carleton H. Schlesman (to Socony-Vacuum Oil Co., Inc.).

Regeneration of synthetic metal silicate adsorbents by oxidation. No. 2,457,556. Heniz Heinemann and Knut A. Krieger (to Attapulgus Clay Co.).

Regeneration of alumina adsorbents by oxidation. No. 2,457,566. Knut A. Krieger and Heinz Heinemann (to Porocel Corp.).

Extruded iron oxide catalysts. No. 2,457,719. Paul R. Pine and Earl C. Ray (to Harshaw Chemical Co.).

Canadian

Fluorescent material consisting of Ca Cd molybdate. No. 452,970. Herman C. Froelich and Ann R. Hersey (to Canadian General Electric Co., Ltd.).

Solid, porous contact mass adapted to effect reaction between silicon and a hydrocarbon halide, said mass comprising essentially silicon and a metallic catalyst for the said reaction. No. 453,141. Winton I. Patnode (to Canadian General Electric Co., Ltd.).

Producing a colloidal aqueous sol of aluminum hydrate by passing an aqueous solution of an aluminum salt through a mass of alkali regenerated anion-exchange material. No. 453,178. John William Ryznar (to National Aluminate Corp.).

Producing substantially electrolyte-free colloidal solutions by removal of the electrolyte from said colloidal sol by passing it in series through an acid regenerated cation-exchange material and an alkali regenerated anion-exchange material. No. 453,179. John William Ryznar (to National Aluminate Corp.).

Organosilicon-silica sols, gels and aerogels. No. 453,431. Robert H. Krieble and John R. Elliott (to Canadian General Electric Co., Ltd.).

Producing chromic acid and calcium chromate by evaporating a portion of the water of an aqueous solution of calcium dichromate with concomitant decomposition of the calcium dichromate and the production of chromic acid in liquid condition and a precipitate consisting essentially of calcium chromate, and separating. No. 453,469. Alan R. Fraser (to Chromium Mining & Smelting Corp., Ltd.).

Inhibition of iron contamination of catalyst with sulphur compounds. No. 453,535. George E. Liedholm, Robert M. Cole, and Irving I. Shultz (to Shell Development Co.).

Aqueous solution for coloring copper or copper alloy surfaces consisting of sodium chlorite and hydroxide selected from the group consisting of sodium hydroxide and potassium hydroxide, and a phosphate salt selected from the group consisting of trisodium phosphate, tripotassium phosphate, sodium tetraphosphate, potassium tetraphosphate, hexameta-sodium phosphate, hexametapotassium phosphate, pyrophosphates and polyphosphates. No. 453,633. L. Joslyn Rogers (to Associated Chemical Co. of Canada, Ltd.).

Making a solid manganese type contact mass characterized by its ability to be oxidized and deoxidized alternately by steam and air, respectively, said process comprising sintering together compounds of manganese, oxygen, boron, and an alkali metal to form a double manganese-metaborate salt $\text{yX}_2\text{MnO}_4\cdot\text{XBO}_3$, wherein X is an alkali metal and y is from 2 to 4. No. 453,647. Eugene O. Brimm (to Dominion Oxygen Co., Ltd.).

Producing a contact mass characterized by its ability to be deoxidized and oxidized alternately by steam and air respectively, by sintering sodium hydroxide, an oxide of manganese, and a compound selected from the group consisting of oxides and salts of aluminum in proportions such as to form theoretically $4\text{Na}_2\text{MnO}_4\cdot\text{Na}_2\text{O}_3\cdot\text{Na}_2\text{O}$. No. 453,648. Eugene O. Brimm (to Dominion Oxygen Co., Ltd.).

Producing a contact mass characterized by its ability to be deoxidized and oxidized alternately by steam and air respectively, by sintering sodium hydroxide, an oxide of manganese, and a compound selected from the group consisting of oxides and salts of silicon in proportions such as to form theoretically $4\text{Na}_2\text{MnO}_4\cdot\text{Na}_2\text{SiO}_3\cdot\text{Na}_2\text{O}$. No. 453,649. Eugene O. Brimm (to Dominion Oxygen Co., Ltd.).

* U. S. Patents from Vol. 616, No. 5. Vol. 617, Nos. 1, 2, 3, 4. Canadian from Nov. 30-Dec. 28.

Making a solid manganate type contact mass characterized by its ability to be oxidized and deoxidized alternately by steam and air, respectively, by sintering compounds of manganese, oxygen, molybdenum, and an alkali metal to form a double manganate-molybdate salt $\gamma\text{NaMnO}_4 \cdot \text{X}_2\text{MoO}_4$, wherein X is an alkali metal and y is from 2 to 4. No. 453,650. Eugene O. Brimm (to Dominion Oxygen Co., Ltd.).

Preparing a manganate type contact mass comprising mixing with an oxide of manganese at least one substance selected from the group consisting of the oxides and hydroxides of the alkali metals, sintering and subsequently oxidizing the sintered mixture by passing oxygen into contact therewith. No. 453,651. Fred R. Whaley and Eugene O. Brimm (to Dominion Oxygen Co., Ltd.).

Reactivating an impaired solid manganate type contact mass of the type normally containing a substantial amount of an active constituent comprising a manganate compound of an alkali metal, the amount of said manganate compound in said mass having been so depleted by the passage of steam and air that said mass has lost some of its ability to take up oxygen during the passage of air, said process comprising maintaining said mass in a hot condition and passing air into contact therewith to promote the reformation of said manganate compound. No. 453,652. Leslie G. Jenness (to Dominion Oxygen Co., Ltd.).

*Leather

Canadian

Filling leather by subjecting hides and skins to a chrome tanning operation in conjunction with a drumming operation in an aqueous dispersion of a solid finely divided member of the group comprising polyvinyl chloride and an interpolymers of vinyl chloride and at least one ethylenically unsaturated polymerizable compound in which vinyl chloride is present in the preoperating amount. No. 453,445. John Burchill, Elias Isaacs, Leslie Budworth, Morgan and Dorothy Joyce Guest (to Canadian Industries Ltd.).

Degreasing pickled hides or skins by treating one of the group comprising grease-containing pickled hides and skins with an aqueous liquor containing an inorganic salt of the group comprising sodium chloride, sodium sulphate, and potassium chloride and an emulsifying agent by condensing an octylated mixture of cresols with between 3 and 11 moles an excess of ethylene oxide said treatment effected under conditions such that an aqueous emulsion of grease is formed. No. 453,447. John Burchill, Ernest G. Cockbank, Keith McLaren and Edryd G. Parry (to Canadian Industries Ltd.).

Filling leather by subjecting hides and skins to a chrome tanning operation in conjunction with a drumming operation in an aqueous dispersion of a solid finely divided interpolymers of ethyl acrylate and acrylonitrile. No. 453,448. John Burchill, Dorothy Joyce Guest and Elias Isaacs (to Canadian Industries Ltd.).

*Metals, Ores

Producing a moisture resistant coating on magnesium powder by contacting said powder with a solution consisting of an alkali metal hydrogen sulphate, an alkali metal dichromate and water. No. 2,454,799. David Hart and Henry J. Eppig.

Bath for electrodepositing bright nickel comprising an aqueous acid solution of a material selected from the group consisting of nickel chloride, nickel sulfate, a mixture of nickel sulfate and nickel chloride, a mixture of nickel fluoroborate and nickel chloride, a mixture of nickel sulfate and nickel fluoroborate, and a mixture of nickel sulfate, nickel chloride and nickel fluoroborate, said solution having dissolved therein 2-nitrovinyl benzene sulfonic acid. No. 2,455,555. Henry Brown (to Udytyle Corp.).

Electrolytic cell for recovery of manganese. No. 2,456,196. James H. Jacobs and Warren H. Yarroll (to Crimora Research and Development Corp.).

Removing incrustations from lead anodes used for chromium plating by suspending the lead article in an aqueous solution consisting essentially of an alkali-metal pyrophosphate, and passing current to the aforesaid lead article, and cathodically reducing the incrustated mixture of lead oxides and lead chromate to lead. No. 2,456,281. Jacob Hyner (to United Chromium, Inc.).

Electrodeposited nickel strip containing boron. No. 2,456,370. Mortimer Pierce Buck (to International Nickel Co.).

Producing an anodic coating upon a magnesium-base alloy by electrolysis in a solution consisting of water, an alkali metal hydroxide, and a water-soluble aliphatic hydroxyl compound selected from the group consisting of methanol, ethanol, ethylene glycol, propylene glycol, glycerol, mannitol, diethylene glycol. No. 2,456,931. Herbert K. De Long (to Dow Chemical Co.).

Electrodepositing thick, ductile coatings of palladium from an aqueous bath containing palladium chloride and concentrated hydrochloric acid. No. 2,457,021. Edmund Merriman Wise and Raymond Francis Vines (to International Nickel Co., Inc.).

Obtaining improved bonding of a nickel electro-deposit to a nickel surface by immersing a nickel starting sheet in an aqueous bath containing sulfuric acid, sodium chloride, and copper in the form of copper sulfate and the balance essentially water, maintaining said copper in the cupric state by passing air through said bath, removing said nickel starting sheet, rinsing with water, immersing in a nickel electro-plating bath. No. 2,457,059. Ralph Cryslar McQuire (to International Nickel Co., Inc.).

Obtaining improved bonding of a nickel electro-deposit by anodically treating in an aqueous chloride-bearing bath consisting of sulfuric acid, sodium chloride, copper sulfate, and water; removing; rinsing; transferring to a nickel electroplating bath. No. 2,457,060. Ralph Cryslar McQuire (to International Nickel Co., Inc.).

Obtaining improved bonding of a nickel electro-deposit having a nickel surface by anodically treating in an aqueous acid bath consisting of sulfuric acid, copper sulfate, and water. No. 2,457,061. Ralph Cryslar McQuire (to International Nickel Co., Inc.).

In a process for the electrodeposition of tin, the process comprising effecting electrodeposition in the presence of a bath soluble polyalkylene oxide. No. 2,457,152. Raymond A. Hoffman (to E. I. du Pont de Nemours & Co.).

Blackening copper alloys by immersing the alloy in an aqueous solution of an alkali selected from the group comprising sodium hydroxide and potassium hydroxide and of an oxidizing agent selected from the group comprising sodium bromate and potassium bromate. No. 2,457,480. Earle B. Lewis.

Canadian

Beneficiating oxidized iron ores by froth flotation which comprises conditioning the ore with an acid substance, the anion of which is a constituent of an acid having a dissociation constant not less than 10^{-7} and which does not adversely affect flotation, an unsulphonated oil, and a collector for oxidized iron minerals containing as its major active

constituent water soluble petroleum sulphonates of the green acid type. No. 452,957. Robert B. Booth and Earl C. Herkenhoff (to American Cyanamid Co.).

Metallizing a non-metallic body by immersing in a solution containing a salt of a metal selected from the group consisting of nickel and cobalt, a hypophosphite, a hydrazine compound, and a compound of a member of the group of platinum metals. No. 453,028. Leopold Fessel (to Radio Corporation of America).

Cleaning and copperplating the surface of a ferrous metal article by immersing in a fused caustic soda bath containing copper oxide and while immersed passing a direct current through said bath and article. No. 453,264. James T. Clenny (to Canadian General Electric Co., Ltd.).

Extracting lead from lead sulphide by melting with lead to form a solution containing lead sulphide and lead, the lead being formed in situ by the reaction of lead compounds with lead sulphide or added in the form of metal, the additional step of oxidizing the lead sulphide in solution to form metallic lead. No. 453,405. Bo Michael Sture Kalling, Gustaf Tanner and Sven Wallden (to Bolidens Gruvaktiebolag).

Chlorinating a chromium ore containing about 10% of chromium by forming a bed which contains said material, passing chlorine through said bed, withdrawing vaporized halides from the upper surface of the bed. No. 453,707. Irving Elkin Muskat (to Pittsburgh Plate Glass).

Method of chlorination which comprises forming a previous bed of chromium bearing material, chlorinating while regulating the quantity of chlorination agent to form a substantial quantity of chromous chloride, introducing a quantity of oxygen sufficient to substantially minimize sintering and maintaining the temperature sufficient to vaporize the chromous chloride. No. 453,708. Irving Elkin Muskat (to Pittsburgh Plate Glass Co.).

Chlorinating a chromite ore by introducing the ore into an upper portion of a furnace and contacting the ore with chlorine at a temperature sufficiently high to volatilize iron chloride and a chloride of chromium and to form a residue containing chlorides which normally tend to cause sintering within the furnace and introducing sulphur trioxide into a lower portion of the furnace to decompose the sintering chlorides and to minimize sintering within the furnace. No. 453,709. Irving Elkin Muskat (to Pittsburgh Plate Glass Co.).

*Organic

N-substituted pantoyl amides. No. 2,3063. William Shive and Esmond Emerson Snell (to Research Corp.).

Preparation of methallyl benzene. No. 2,454,779. David Davidson and Samuel J. Kahn (to Trubek Laboratories, Inc.).

Production of alpha tetralol from tetralin by passing oxygen through tetralin containing a comminuted metal carbonate catalyst and oxidizing tetralin to tetralin peroxide; treating the tetralin oxidation reaction product with an aqueous caustic solution to convert the tetralin peroxide to a mixture of alpha tetralone and alpha tetralol; distilling in vacuo and separating tetralin therefrom; adding copper-oxide chromium-oxide catalyst to the remaining mixture of alpha tetralone and alpha tetralol; subjecting the admixture to hydrogen under pressure and thereby hydrogenating alpha tetralone to alpha tetralol; distilling under vacuum to recover alpha tetralol. No. 2,454,804. Robert Johnson (to Koppers Co., Inc.).

Breaking emulsions of the water-in-oil type comprising subjecting the emulsions to the action of a blown mixed ester of a polyhydric alcohol and a mixture of at least 2 dissimilar unsaturated carboxylic acids. No. 2,454,808. Willard H. Kirkpatrick and Doynne L. Wilson (to Visco Products Co.).

Making hexachlorobutadiene by passing chlorinated butane into a reaction zone maintained between about 425° and 550° C. No. 2,454,820. Earl T. McBee and Lawrence W. Devaney (to Purdue Research Foundation).

N-propyl diaminodiphenylsulfone. No. 2,454,835. Albert L. Rawlins (to Parke, Davis & Co.).

Reaction product of an alcohol ester of an alkenyl-substituted succinic acid containing at least 3 carbon atoms in the alkenyl substituent. No. 2,454,862. George T. Collins (to Allied Chemical & Dye Corp.).

Preparing unsaturated alcohols. No. 2,454,936. Glen H. Morey (to Commercial Solvents Corp.).

Process of treating glyceride oils with activated magnesium oxide. No. 2,454,937. Wendell W. Moyer and Ralph A. Marmor (to A. E. Staley Mfg. Co.).

4-dialkylaminoalkylamino-6-methoxyquinoline. No. 2,454,949. Horace A. Shonle and Arthur M. Van Arendonk (to Eli Lilly and Co.).

4-alkylmorpholinyl sulfoxide trioxide compounds. No. 2,454,978. Mario Scialera, Charles T. Lester and Elizabeth M. Hardy (to American Cyanamid Co.).

Reacting acetylene and potassium hydroxide. No. 2,455,058. Daniel F. Herman (to Publisher Industries, Inc.).

4-amino-1,8-naphthalic imide disulfonic acids. No. 2,455,095. Mario Scialera and Warren S. Forster (to American Cyanamid Co.).

Purification of tetrahydrofurfuryl alcohol containing furfural and furfuryl alcohol as impurities. No. 2,455,159. John George Mackay Bremner and David Gwyn Jones (to Imperial Chemical Industries, Ltd.).

Reacting propargyl aldehyde diethyl acetal with guanidine nitrate in an acidic liquid to produce a salt of 2-aminopyrimidine. No. 2,455,172. George W. Hearne, Theodore W. Evans and Harry L. Yale (to Shell Development Co.).

Aldehyde derivatives of 2-aminoalkanes. No. 2,455,193. Ewald Rohrmann (to Eli Lilly and Co.).

Simultaneously saponifying and reducing an acyl glucoside of an oxy-oxo cyclo pentane poly hydro-phenanthrene compound selected from the group consisting of the oestrane, androstane, pregnane series and their dehydrogenation products, comprising treating said compound with free alkali metal and alcohol. No. 2,455,214. Ingolf Bennekou (to Lovens kemiske Fabrik v/Aug. Kongsted).

Manufacture of permanently colorless alpha-ethyl-hexoic acid by hydrogenating alpha-ethyl-beta-propyl-acrolein to produce a mixture of alpha-ethyl hexaldehyde and unchanged alpha-ethyl-beta-propyl-acrolein, and treating with molecular oxygen. No. 2,455,241. Bruce Duval and Karl Heinrich Walter Tuerck (to Distillers Co., Ltd.).

2-methyl-3-hydroxy-4-hydroxymethyl pyridine and its acid salts. No. 2,455,259. Gustav J. Martin and Sourin Avakian (to National Drug Co.).

Ether of 5-hydroxy, 3-methyl, penta-3-en-yne-1. No. 2,455,261. Nicholas A. Milas (to Research Corp.).

Reacting an alpha-furyl substituted organic sulphonate with an aldehyde, gelling and heating until it is insoluble. No. 2,455,282. Jack T. Thurston (to American Cyanamid Co.).

Fractional condensation of a phthalic anhydride of low maleic anhydride content. No. 2,455,314. Kurt F. Pietzsch (to American Cyanamid Co.).

* U. S. Patents from Vol. 616, No. 5. Vol. 617, Nos. 1, 2, 3, 4. Canadian from Nov. 30-Dec. 28.

Oxyntiation of a mononuclear aromatic hydrocarbon by contacting with nitric acid and mercuric nitrate until the aromatic phase contains at least 10% by weight nitrophenols. No. 2,455,322. Wilber Otis Teeters and Max B. Mueller (to Allied Chemical & Dye Corp.).

Producing DDT by condensing chloral with chlorobenzene in the presence of hydrogen fluoride. No. 2,455,388. Adrian C. Smith and Julian L. Staubly (to Pennsylvania Salt Mfg. Co.).

Organic nitrogen compounds. No. 2,455,396. Robert Raymond Adams and Harry Stone Mosher (to Parkes, Davis & Co.).

Manufacture of monochloroacetic acid by reacting ethylene chlorohydrin and nitric acid. No. 2,455,405. Lawton A. Burrows and Mack F. Fuller (to E. I. du Pont de Nemours & Co.).

Synthesis of hydrocarbons and regeneration of synthesis catalyst. No. 2,455,419. Everett A. Johnson (to Standard Oil Co.).

Production of 2,2-dinitro-propane and 1,2-dinitro-isobutane by heating isobutane with nitrogen dioxide in the vapor phase. No. 2,455,425. Norman Levy, Charles William Seale and Dorothy Shaw Turner Bryson (to Imperial Chemical Industries Ltd.).

Ditertiary butyl isopropylidene peroxide. No. 2,455,569. Frank H. Dickey (to Shell Development Co.).

Preparing diacetyl by adding 2,3-butanediol to copper chromite catalyst. No. 2,455,631. Oliver J. Weinkauff (to Monsanto Chemical Co.).

Refining aromatic hydrocarbons. No. 2,455,634. Philip J. Wilson, Jr., Joseph H. Wells and Charles R. Liebel (to Carnegie-Illinois Steel Corp.).

Condensing an aralkyl organic compound of the group consisting of the aralkyl hydrocarbons and the halogenated aralkyl hydrocarbons containing at least one hydrogen atom linked to a nuclear carbon atom with a ketone of the group consisting of the aliphatic ketones and the halogenated aliphatic ketones in the presence of a condensation catalyst selected from the group consisting of sulfuric acid, phosphoric acids and sulfonic acids. No. 2,455,643. Arthur B. Bakalar (to Shell Development Co.).

Converting aldoximes to nitriles which comprises contacting aldoximes with amine salts. No. 2,455,651. Newman M. Bornick (to Rohm & Haas Co.).

4,4'-di(allylcarbonato) diphenyl sulfone. No. 2,455,653. James A. Bralley and Frank B. Pope (to B. F. Goodrich Co.).

Producing a vinyl acetylene by reacting $R_1(CHX)_2CR_2XCR_3XR_4$ wherein C represents a carbon atom, H represents a hydrogen atom, and wherein R_1, R_2, R_3 , and R_4 each represent a substituent selected from the group consisting of a hydrogen atom, an alkyl group, and an aryl group and X represents a halogen atom in an alcoholic alkali hydroxide solution to form $R_1CH=CHCR_2R_3R_4$ wherein C represents a carbon atom and wherein R_1, R_2, R_3 , and R_4 each represent a substituent selected from the group consisting of a hydrogen atom, an alkyl group and an aryl group. No. 2,455,677. Joseph T. Horeczy (to Standard Oil Development Co.).

Nitrile selected from the group consisting of acrylonitrile, alpha-substituted acrylonitriles wherein the substituent on the alpha carbon atom is a lower alkyl radical, and beta-substituted acrylonitriles wherein the substituent on the beta carbon atom is a lower alkyl radical, containing a cyanohydrin to stabilize against auto-polymerization. No. 2,455,689. Kenneth E. Marple and Bert Borders (to Shell Development Co.).

Purifying nuclear-chlorinated bis-phenols by steam distillation. No. 2,455,703. Louis F. Reuter (to B. F. Goodrich Co.).

Halogenated pyran compounds. No. 2,455,776. David Gwyn Jones and John George Mackay Bremner (to Imperial Chemical Industries, Ltd.).

Preparing a 1-substituted-3-cyanoguanidine by reacting a member of the group consisting of dicyanamide and a metal salt with a member of the group consisting of a primary amine, a secondary amine and a salt thereof. No. 2,455,807. Bryan C. Redmon and Daniel E. Nagy (to American Cyanamid Co.).

Production of 1-mono- and 1,2-disubstituted-3-cyanoguanidines. No. 2,455,894. Hans Z. Lecher, Robert Prescott Parker, and Robert Sidney Long (to American Cyanamid Co.).

Preparation of alkali metal salts of dicyanamide. No. 2,455,895. Daniel E. Nagy and Bryan C. Redmon (to American Cyanamid Co.).

1-aryl-, 5-alkyl biguanides. No. 2,455,896. Daniel E. Nagy (to American Cyanamid Co.).

1,5-diarylbisguanides from aromatic amines and dicyanamide. No. 2,455,897. Daniel E. Nagy (to American Cyanamid Co.).

Addition product of a ferric halide selected from the group, consisting of ferric chloride and ferric bromide and nicotinic acid diethylamide. No. 2,455,924. Ernst A. H. Friedheim and Saul Soloway.

Making N-methyl aniline by aminating mono-chlorobenzene with an aqueous phase containing mono-methylamine and copper chloride. No. 2,455,931. Everett C. Hughes (to Standard Oil Co.).

Making arylamines by mixing a non-aqueous phase comprising chlorobenzene with an excess of an ammoniacal compound selected from the group consisting of ammonia and lower alkyl amines and a copper chloride catalyst. No. 2,455,932. Everett C. Hughes (to Standard Oil Co.).

Dialkylaminoalkyl benzhydryl ethers and salts thereof. No. 2,455,949. George Rieveschl, Jr. (to Parke, Davis & Co.).

Polymers from carbonylamine and carboxylic compounds. No. 2,455,983. Claude Bonard, administrator of Henry Dreyfus, deceased (to Celanese Corp. of America).

Hydrogen cyanide by passing ammonia mixed with carbon monoxide in contact with a catalyst which comprises manganese dioxide. No. 2,455,987. Leonard Fallows and Eric Vernon Mellers (to Celanese Corp. of America).

Nitriles by reacting a compound from the group consisting of hydrocarbons containing not more than 10 carbon atoms and having an aliphatic chain containing one double bond, said double bond linking a tertiary carbon atom to another carbon atom and hydrocarbons containing 3 to 6 carbon atoms and having one double bond, said bond linking a secondary carbon atom to another carbon atom with hydrogen cyanide in the presence of a non-metallic catalyst selected from the group consisting of activated alumina, silica, titania, magnesium silicate and mixtures thereof. No. 2,455,995. Charles R. Harris and Wilbur W. De Atley (to E. I. du Pont de Nemours & Co.).

Production of fluorocarbons by heating carbon in an atmosphere of fluorine and in the presence of at least one material from the group consisting of the fluorides of mercury, antimony, aluminum and iron. No. 2,456,027. Joseph H. Simons (to Minnesota Mining & Mfg. Co.).

Alkyl fluorocarbon compound C_nF_{2n+2} having 5 carbon atoms in the ring. No. 2,456,028. Joseph H. Simons (to Minnesota Mining & Mfg. Co.).

N-dodecanoylsulfanilamides. No. 2,456,051. Martin E. Hultquist and Elmore H. North (to American Cyanamid Co.).

1-guanyl guanazole. No. 2,456,090. John Kenyon Simons (to Libbey-Owens-Ford Glass Co.).

Paraformaldehyde containing, as an agent for controlling and stabilizing polymer reactivity, pentaerythritol. No. 2,456,161. Joseph Frederic Walker (to E. I. du Pont de Nemours & Co.).

Reacting acetylene and chlorine in the liquid phase in a liquid mixture having substantially the composition of about 11 to 60% of tetrachlorethane, about 18 to 60% of pentachlorethane and about 12 to 25% of beta-trichlorethane, under the influence of light from ultraviolet through the visible range. No. 2,456,173. Oliver W. Cass (to E. I. du Pont de Nemours & Co.).

Monomeric addition products of azobisformates and polyfluoroethylenes. No. 2,456,176. Richard D. Cramer (to E. I. du Pont de Nemours & Co.).

N-alkyl polymeric amine acids and coating compositions containing them. No. 2,456,177. Martin E. Cuperly (to E. I. du Pont de Nemours & Co.).

Removing impurities of the class consisting of 1,1,2-trichlorethane and asymmetrical tetrachlorethane from tetrachlorethylene by extraction with a liquid which is immiscible with said tetrachlorethylene, comprising 50 to 95% of methanol and 5 to 50% water by volume. No. 2,456,184. William C. Greenwald (to E. I. du Pont de Nemours & Co.).

Production of a cyanhydrin acetate by reacting a cyanhydrin with acetic anhydride in the presence of triethylamine. No. 2,456,188. Virgil L. Hansley and John E. Bristol (to E. I. du Pont de Nemours & Co.).

Bis ester of a benzenediadic acid with a monohydric alcohol containing not more than 9 carbon atoms and having an ethylene double bond in alpha, beta position with respect to the carbinol carbon, said alcohol being selected from the group consisting of primary and secondary monohydric alcohols. No. 2,456,210. Henry C. Miller (to E. I. du Pont de Nemours & Co.).

Making a phenyl pyridyl sulfone compound by reacting a salt of benzene sulfonic acid having in p-position to the sulfonic acid group a radical having nuclearly bound nitrogen and selected from the class consisting of the amino group, acyl-amino groups and the nitro group with a halogenated pyridine compound having in p-position to halogen a member of the class consisting of an amino group, a group hydrolyzable to an amino group and a group reducible to an amino group. No. 2,456,258. Max Dohn and Otto Laubereau (to Attorney General of the U. S. A.).

Making amines by heating in contact with hydrogen and a hydrogenation catalyst a carboxylic acid diester of a 1,1-glycol and diester of a substance selected from the group consisting of ammonia, primary amines, and secondary amines, the amino group in said amines being the sole functional group. No. 2,456,315. William W. Prichard (to E. I. du Pont de Nemours & Co.).

Producing a-ethyl-piperonyl ethers by condensation of an isosafrole hydrohalide of the group consisting of isosafrole hydrochloride and isosafrole hydrobromide and a compound of the formula HOR with the elimination of hydrogen halide in the presence of a hydrogen halide acceptor selected from the group consisting of alkali and alkaline earth metal carbonate and hydroxides activated with a small catalytic quantity of an organic nitrogen base. No. 2,456,316. Edward A. Prill (to Boyce Thompson Institute for Plant Research, Inc.).

Esters of p-di(omega-hydroxy-alkoxy) benzenes esterified with acrylic acid, chloroacrylic, methacrylic, ethacrylic and crotonic acids. No. 2,456,318. Edward O. Ramler (to E. I. du Pont de Nemours & Co.).

Industrial production of ethylene chlorohydrin by interaction of ethylene and hypochlorous acid by isolation of the ethylene chlorohydrin after the reaction has been completed, by contacting with a neutral liquid organic solvent which contains solvent carbonyl group. No. 2,456,350. Charles Weizmann (to Ketarome Ltd.).

Forming aromatic hydrocarbons by contacting hydrocarbons containing naphthenes with hydrogen and a composite catalyst consisting of molybdenum oxide supported on a zinc aluminate spinel base. No. 2,456,351. Albert B. Welty, Jr., and Clinton H. Holder (to Standard Oil Development Co.).

Tertiary amino lower alkyl ester of dehydrocholic acid. No. 2,456,363. Franz Bergel, Alexander Lang Morrison, Albert Ronald Moss, Mari-ann Konigstein and Heinrich Rinderknecht (to Hoffman-La Roche Inc.).

Separating 2,4-lutidine and 2,5-lutidine by reacting with an anhydrous hydrohalide to precipitate the 2,4-lutidine in the form of a solid, anhydrous, simple hydrohalide and separating the precipitate. No. 2,456,377. Francis E. Cislak and Merrit M. Otto (to Reilly Tar & Chemical Corp.).

Producing carbazole by mixing orthoamino diphenyl with an excess of a mildly oxidizing gas. No. 2,456,378. Francis E. Cislak and Arthur L. Kranzfelder (to Reilly Tar & Chemical Corp.).

Crystalline 2-amino-5-methylpyridine by reacting 3-methylpyridine with sodamine. No. 2,456,379. Francis E. Cislak and Arthur L. Kranzfelder (to Reilly Tar & Chemical Corp.).

Producing nicotinonitrile, by subjecting nicotine to partial oxidation in the presence of an oxidation catalyst comprising an oxide of an element of the A sub-groups V and VI of the periodic system. No. 2,456,380. Francis E. Cislak and William R. Wheeler (to Reilly Tar & Chemical Corp.).

Reacting a low-boiling olefin and an alkylatable cyclic organic compound in the presence of a hydrofluoric acid catalyst. No. 2,456,435. Maryann P. Mataszak (to Phillips Petroleum Co.).

2,3-bis(3,4-carbonyldioxybenzyl)-butane. No. 2,456,443. George P. Mueller, Eric T. Stiller and Samuel V. Lieberman (to Wyeth Inc.).

2-chloroindone. No. 2,456,452. Nelson V. Seeger (to Wingfoot Corp.).

Refining of inositol solutions. No. 2,456,470. McCalip J. Thomas (to A. E. Staley Mfg. Co.).

Purification of diphenyl monosulfide of objectionable color and odor to produce a colorless product subjecting said diphenyl monosulfide to the action of a mixture of a metal above hydrogen in the electromotive series and an inorganic acid. No. 2,456,500. Everett E. Gilbert and Howard D. Segool (to Allied Chemical & Dye Corp.).

Condensation of ketenes with esters of keto acids. No. 2,456,503. Hugh J. Hagemeyer, Jr. (to Eastman Kodak Co.).

An alpha-acyl-alpha-(2-cyanoethyl) succinic acid ester. No. 2,456,517. Elbert C. Ladd and Homer W. Paxton (to U. S. Rubber Co.).

Preparing butane-1,2,4-tricarboxylic acid by treating diethyl alpha-acetyl-alpha-(2-cyanoethyl) succinate with an alkali-metal hydroxide. No. 2,456,543. Pliny O. Tawney (to U. S. Rubber Co.).

Making chloral by chlorinating ethylene chlorohydrin. No. 2,456,545. Thomas H. Vaughn (to Wyandotte Chemicals Corp.).

Oxidizing an aldehyde to a fatty acid which comprises passing a gaseous fluid containing free oxygen into contact with a mixture of such aldehyde with a catalyst which is a mixture of the manganese, cobalt and lead salts of an unsaturated aliphatic acid. No. 2,456,549. Charles Weizmann (to Polymerisable Products Ltd.).

Secondary alkyl (secondary) amino alcohol esters of aryl-substituted aliphatic acids. No. 2,456,555. Arthur C. Cope (to Sharp & Dohme, Inc.).

Secondary-alkyl (secondary) amino alcohol esters of paradialkyl amino benzoic acid. No. 2,456,556. Arthur C. Cope (to Sharp & Dohme, Inc.).

Azeotropic separation of xylene isomers. No. 2,456,561. George R. Lake and Josephine M. McDowell (to Union Oil Co. of Calif.).

Aminotriazine product. No. 2,456,567. Milton J. Scott (to Monsanto Chemical Co.).

Preparing metacresol-1,3,4-xenol from 1,3,4-xenol and a mixture con-

sisting mainly of metacresol and paracresol. No. 2,456,581. Francis E. Cislak and Merritt M. Otto (to Reilly Tar & Chemical Corp.).

Separation of isomeric xylenes. No. 2,456,582. Francis E. Cislak and Merritt M. Otto (to Reilly Tar & Chemical Corp.).

Preparing lead nitroaminoguanidine by reacting nitroaminoguanidine with an aqueous slurry of lead hydroxide in the presence of a hydrophilic colloid. No. 2,456,583. Le Roy V. Clark (to American Cyanamid Co.).

Conversion of dimethyl ether to normally liquid hydrocarbons. No. 2,456,584. Everett Gorin and Manuel H. Gorin (to Socony-Vacuum Oil Co., Inc.).

Production of nitrohydroxy compounds. No. 2,456,585. Henry B. Hass and James F. Bourland (to Purdue Research Foundation).

2-butoxyethyl fluoracetate. No. 2,456,586. Ingenium Hechenbleikner (to American Cyanamid Co.).

Production of benzyl mercaptan by reaction of benzyl chloride with an alkali metal hydrosulphide. No. 2,456,588. Anthony Loverde (to Hooker Electrochemical Co.).

4-amino-4-methylvalerolactamides. No. 2,456,590. Glen H. Morey (to Commercial Solvents Corp.).

Phenol by catalytic oxidation of benzene. No. 2,456,597. Carleton H. Schlesman, William I. Denton and Richard B. Bishop (to Socony-Vacuum Oil Co., Inc.).

Preparing methylamines by mixing methanol and ammonia, vaporizing, passing over an alumina catalyst and relatively repressing the formation of trimethyl amine by adding water. No. 2,456,599. Everett Foy Smith (to Commercial Solvents Corp.).

Production of branched chain hydrocarbons which comprises simultaneously dehydrogenating and isomerizing a paraffinic hydrocarbon by the action of a dehydrogenating catalyst in physical admixture with a minor proportion of an isomerizing catalyst. No. 2,456,672. Herman S. Bloch and Raymond E. Schaad (to Universal Oil Products Co.).

Oxidizing alcohols. No. 2,456,683. Richard M. Deanesly (to Universal Oil Products Co.).

Isomerizing a natural fat containing glycerol esters of oleic acid by mixing a solution of said fat with a solution of nitrous acid in a water-miscible organic fat solvent. No. 2,456,691. William R. Eipper.

Separating *o*-diolefin from a *o*-monoolefin which comprises selectively absorbing the *o*-diolefin in an alkyl amine cuprous salt complex solution. No. 2,456,722. Charles E. Morrell and Miller W. Swaney (to Standard Oil Development Co.).

Improvement in separating an unsaturated hydrocarbon from a mixture containing a relatively more saturated hydrocarbon by absorbing in a solution of an alkyl amine cuprous acetate complex containing water and alkyl amine which has from 1-4 carbon atoms. No. 2,456,723. Leland K. Beach (to Standard Oil Development Co.).

Separation of *di*-isoleucine from mixtures of *di*-isoleucine and *di*-allo-isoleucine by reacting with a hot solution of a substance selected from the group, sodium and sodium hydroxide in a lower aliphatic alcohol, cooling and removing the precipitated sodium salt of *di*-isoleucine. No. 2,456,742. Anthony C. Shabica (to Merck & Co., Inc.).

Separating racemic tartaric acid by making a solution in hot water of racemic tartaric acid and 2-(*d*-gluco-*d*-gulo-hepto-hexa-hydroxy-hexyl)-benzimidazole, cooling, and separating the resulting levo benzimidazole salt from the dextro salt. No. 2,456,752. Joseph D. Surmatis (to The Brush Development Co.).

Acetylene tetramethacrylate. No. 2,456,759. Jesse O. White (to E. I. du Pont de Nemours & Co.).

Polyfluorinated propionitriles. No. 2,456,768. David W. Chaney (to American Viscose Corp.).

In resolving a mixture of 3-picoline, 4-picoline and 2,6-lutidine, the steps that comprise treating with zinc chloride to react with the picolines, subjecting the resulting mixture to steam distillation 2,6-lutidine, decomposing the residual picoline-zinc chloride addition product to liberate a picoline mixture free from other nitrogen bases, and precipitating 3-picoline as phosphate. No. 2,456,773. Karl Henry Engel (to Allied Chemical & Dye Corp.).

In separating quinoline from a mixture with closely-related, like-boiling nitrogen bases, treating the mixture in the presence of water with phosphoric acid to precipitate quinoline phosphate, the amount of water present being sufficiently high to retain in solution all the nitrogen bases except quinoline. No. 2,456,774. Karl H. Engel (to Allied Chemical & Dye Corp.).

Preparing carboxylic acid amines by heating a ketone having the formula $R-CO-R'$, where R is alkyl and R' is a member of the group consisting of alkyl and aralkyl, with aqueous ammonium polysulfide. No. 2,456,785. John A. King (to Winthrop-Stearns Inc.).

Oil-soluble drier metal salt and a lesser amount of an alkyl acid phosphate wherein the alkyl group embodies not more than 8 carbon atoms. No. 2,456,824. Alfred Fischer (to Nuodex Products Co., Inc.).

Disubstituted acetamindyl derivatives of amino quinolines. No. 2,456,911. William F. Bruce (to Wyeth Inc.).

3,4-methylenedioxyphenyl-propylene compound. No. 2,456,991. Edward A. Prill (to Boyce Thompson Institute for Plant Research, Inc.).

Reacting castor oil with a mixture of boric and phosphoric acids in proportions to form boron phosphate whereby the oil is dehydrated. No. 2,456,996. John B. Rust (to Montclair Research Corp. and Ellis-Foster Co.).

2-(2-phenyl)-5-dihydroimidazolones. No. 2,457,047. Lucas P. Kyrides (to Monsanto Chemical Co.).

Making tertiary amines. No. 2,457,048. Lucas P. Kyrides and Ferdinand B. Zienty (to Monsanto Chemical Co.).

1-propenyl-2-hydroxy-3-ethoxy benzene. No. 2,457,074. Oliver J. Wein-kauf (to Monsanto Chemical Co.).

Substituting bromine for hydrogen on an olefinic carbon atom in the ring structure of a 5-membered amino-substituted heterocyclic compound which contains in the ring structure at least 1 nitrogen atom, at least 1 atom of sulfur or selenium, and a formation in the ring represented by $-CH=$ by heating in water in the presence of an acid, adding bromine and recovering the brominated product. No. 2,457,078. Ferdinand B. Zienty and Lucas P. Kyrides (to Monsanto Chemical Co.).

Stable composition consisting of 2-phenyl chloride and a small portion of an amine of the formula type: R, R_1, R_2 in which R represents a radical selected from the group consisting of hydrogen, alkyl, cycloalkyl, and aralkyl radicals, R_1 and R_2 each represent a radical selected from the group consisting of alkyl radicals containing at least 8 carbon atoms, cycloalkyl radicals containing at least 5 carbon atoms in their ring structure and aralkyl radicals. No. 2,457,079. Ferdinand B. Zienty (to Monsanto Chemical Co.).

Stable composition consisting of 2-phenyl chloride and a small portion of an amine selected from the group consisting of morpholinyl and piperidyl derivatives. No. 2,457,080. Ferdinand B. Zienty (to Monsanto Chemical Co.).

Stable composition consisting of 2-phenyl chloride and a small portion of an amine selected from the group consisting of pyrrolidones. No. 2,457,081. Ferdinand B. Zienty (to Monsanto Chemical Co.).

Preparing 2-amino-4-hydroxy-6-methylpyrimido [4,5-b] pyrazine by mix-

ing 2,4,5-triamino-6-hydroxy pyrimidine and an ester of a halo-acetol. No. 2,457,109. James H. Boothe (to American Cyanamid Co.).

Synthesis of esters of succinic acid by heating a beta-alkoxy-propionic ester. No. 2,457,111. William F. Gresham (to E. I. du Pont de Nemours & Co.).

Fatty acid esters of a mixture of heteric oxyethylene-oxy 1,2-propylene diols in which ethylene oxide and 1,2-propylene oxide are combined therein as oxyethylene and oxy 1,2-propylene groups. No. 2,457,139. Harry R. Fife and Walter J. Toussaint (to Carbide & Carbon Chemicals Corp.).

Preparing calcium ascorbo-salicylate by mixing ascorbic acid and salicylic acid and adding a suspension of calcium hydroxide. No. 2,457,141. Joel G. Freeman (to Pharmaceutical Organics, Inc.).

Synthesis of esters from methanol carbon monoxide and a catalyst of the class consisting of metallic cobalt, cobalt oxide, cobalt carbonyl, and cobalt carbonyl hydride. No. 2,457,204. Richard E. Brooks (to E. I. du Pont de Nemours & Co.).

Deacoholizing a beta-alkoxy-substituted monocarboxylic acid ester to an unsaturated carboxylic acid ester by passing the beta-alkoxy-substituted monocarboxylic acid ester over a solid inorganic base. No. 2,457,225. William F. Gresham (to E. I. du Pont de Nemours & Co.).

Synthesis of choline chloride by heating methyl formate with a beta-(alkoxymethoxy)ethyl dimethylamine, treating with hydrochloric acid and an alkane and thereafter separating choline chloride. No. 2,457,226. William F. Gresham (to E. I. du Pont de Nemours & Co.).

Preparation of a dialkyl ether ethylene reaction product which comprises heating under ethylene pressure a dialkyl ether free of olefinic unsaturation and a peroxy catalyst. No. 2,457,229. William E. Hamford and John R. Roland (to E. I. du Pont de Nemours & Co.).

Separation of oxygenated compound with bisulfite adducts. No. 2,457,257. Vesta F. Michael and Scott W. Walker (to Stanolind Oil and Gas Co.).

1,2-epoxide selected from the group consisting of 1,2-epoxytetradecane and 1,2-epoxyoctadecane. No. 2,457,328. Daniel Swern and Geraldine N. Bilen (to U. S. A. by Sec. of Agriculture).

Acetated α -aminobenzenesulfonamides. No. 2,457,371. Rudolf Hirt, Hans Gysin and Henry Martin (to J. R. Geigy A.G.).

Separating glutamic acid amides of 4-[[2-amino-4-hydroxy-6-pyrimido [4,5-b] pyrazyl] methyl] amino-benzoic acid from related pterins. No. 2,457,375. Brian L. Hutchings (to American Cyanamid Co.).

Hydrogenolysis of thiol esters. No. 2,457,392. Ralph Mozingo (to Merck & Co., Inc.).

Substituted pyridine compound. No. 2,457,484. John Halley Mowat (to American Cyanamid Co.).

Preparation of monoethenoic acids and their esters. No. 2,457,611. Daniel Swern and Waldo C. Ault (to U. S. A. by Sec. of Agriculture).

Synthesis of organic acid amides having a tertiary carbon atom attached to an amide nitrogen which comprises subjecting a nitrile to reaction with a tertiary olefin in an aqueous medium, containing an acid-reacting catalyst. No. 2,457,660. William F. Gresham and William E. Grigsby (to E. I. du Pont de Nemours & Co.).

Synthesizing unsaturated ketones comprising contacting an open-chain olefinic hydrocarbon having at least 3 carbon atoms with a fatty acid anhydride in the presence of a catalyst selected from the group consisting of aryl sulfonic acids, sulfo-fatty acids and halo-sulfonic acids. No. 2,457,696. George E. Lukes and Ralph C. Swann (to Pure Oil Co.).

Canadian

Apparatus for producing carbon black by the thermal decomposition of an endothermic gas. No. 453,032. Charles Kaufmann and Ronald Henry Hall (to Shawinigan Chemicals Ltd.).

Producing liquid condensable organic compounds from vegetable materials by impregnating cellulose material with a soda lye. No. 453,034. Jacques Urison, Philippe de Calignon and Gustave Pingaud (to Société Pyréneenne de Carburants et Solvants).

In the process of producing levulinic acid in which a starch and acid are reacted to produce a mixture of humin and levulinic acid which are separated by filtration and distillation to recover the levulinic acid and produce a fluid tarry residue, the improvement which comprises forming a water slurry of said tarry residue to precipitate solid humin from the resulting aqueous solution of levulinic acid, filtering and returning the filtrate to the original point of distillation. No. 453,036. Walter G. Meyer (to A. E. Staley Mig. Co.).

Production of isopentane by contacting normal pentane with an aluminum chloride isomerization catalyst in the presence of a hydrogen halide promoter with an added minor effective amount of cyclohexane. No. 453,049. Eugene Edward Sensel, William Rusler Smith and Arthur Raymond Goldsby (to Texaco Development Corp.).

Reacting a metal chlorosulphonate with a hydroxy aliphatic compound selected from the group consisting of aliphatic alcohols, hydroxy aliphatic acids, and hydroxy aliphatic acid esters, to produce an unsaturated aliphatic compound. No. 453,118. Philip M. Kirk and Louis C. Jones (to American Cyanamid Co.).

Making chloroacetonitrile by treating glycolonitrile in the presence of an organic base with an acid chloride chosen from the group consisting of thionyl chloride, phosphorous trichloride, phosphorous pentachloride, and phosphorous oxychloride. No. 453,119. Ingenium Hechenbleikner (to American Cyanamid Co.).

Di-alpha-furyl ketone disulphonate. No. 453,120. Jack Theo Thurston (to American Cyanamid Co.).

Preparing a diazotized dispersion of 2,4-dinitro-6-halogen aniline by nitrating a compound included in the group of 2-chlor-4-nitraniline and 2-brom-4-nitraniline with mixed nitrating acids and diazotizing without isolation of the nitrated product to produce an aqueous dispersion of the diazotized 2,4-dinitro-6-halogen aniline. No. 453,121. David L. Tochorn and Glenn S. Watson (to American Cyanamid Co.).

Diarylguanidine thiazole formaldehyde complex. No. 453,122. Arnold R. Davis (to American Cyanamid Co.).

Condensing an alkyl silicil by heating to effect dehydration while the said silicil is mixed with an alkyl borate. No. 453,140. Eugene G. Rochow (to Canadian General Electric Co., Ltd.).

α : β -di-[benzimidazolyl-(2)]-ethylenes by treating α : β -di-[benzimidazolyl-(2)]-ethane or a substitution product thereof or a salt of either of these compounds at a raised temperature with a dehydrogenating agent. No. 453,155. Jules Meyer, Charles Graenacher and Franz Ackermann (to Ciba Ltd.).

Acyl aminosulphonic acid. No. 453,164. Henry Martin, Rudolf Hirt, Curt Glatthaar and Hans Heinrich Zaeslin (to J. R. Geigy A. G.).

dl-Tocopherols and process for the manufacture of same. No. 453,166. Paul Karrer and Otto Isler (to Hoffmann-La Roche Ltd.).

dl-Tocopherols and process for the manufacture of same. No. 453,167. Paul Karrer and Otto Isler (to Hoffmann-La Roche Ltd.).

dl-Tocopherols and process for the manufacture of same. No. 453,168. Paul Karrer and Otto Isler (to Hoffmann-La Roche Ltd.).

dl-Tocopherols and process for the manufacture of same. No. 453,169. Paul Karrer and Otto Isler (to Hoffmann-La Roche Ltd.).

Preparation of thiophene from acetylene and hydrogen sulphide with a

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catalyst containing at least one sulphide of the metals, lead, manganese, copper, tin, molybdenum, cobalt, nickel, supported on a porous support. No. 453,171. Michael Henry Miller Arnold (to Imperial Chemical Industries, Ltd.).

Glyoxal tetra (2-ethyl hexyl) acetal. No. 453,270. Louis G. MacDowell and Raymond W. McNamee (to Carbide and Carbon Chemicals, Ltd.). Apparatus for the manufacture of amorphous carbon. No. 453,311. Joseph W. Ayers (to Phillips Petroleum Co.).

Manufacture of amorphous carbon. No. 453,312. Joseph W. Ayers (to Phillips Petroleum Co.).

In a process for the production of diacetone glycol by catalytic hydrogenation of diacetone alcohol in the presence of Raney nickel and under a superatmospheric pressure the method of suppressing cleavage of the diacetone alcohol and accelerating the rate of hydrogenation which comprises effecting the hydrogenation in the presence of water. No. 453,324. William C. Smith (to Shell Development Co.).

Production of ethylene oxide by the direct catalytic oxidation of ethylene which comprises reacting ethylene with oxygen in the presence of a catalyst essentially comprising a substantially inert support material and an adherent, uniform, pellicular deposit of silver metal formed upon and in the presence of the support material. No. 453,325. Harry deV. Finch and Ingolfur Bergsteinsson (to Shell Development Co.).

Production of ethylene oxide by the direct catalytic oxidation of ethylene which comprises reacting ethylene with oxygen in the presence of a catalyst essentially comprising a substantially inert support material which comprises silicon carbide and an adherent, uniform, pellicular deposit of silver metal formed upon and in the presence of the support material. No. 453,326. Ingolfur Bergsteinsson and Harry deV. Finch (to Shell Development Co.).

Preparing finely divided nitroguanidine by forming an aqueous solution of nitroguanidine, adding ethylene diamine and cooling to precipitate the nitroguanidine in a finely divided form. No. 453,389. George H. Foster and Emil F. Williams (to American Cyanamid Co.).

Preparing guanidine carbonate by heating a solution in water of cyanamide and ammonium carbonate in the presence of NH_3 . No. 453,394. Joseph H. Paden and Leslie C. Lane, Jr. (to American Cyanamid Co.).

Preparing dibenzyl ω -cyanoguanilyliminocarbonate by mixing a benzyl halide with a compound of the group consisting of alkali metal ω -cyanoguanilyliminodithiocarbonates and alkaline earth metal ω -cyanoguanilyliminodithiocarbonate. No. 453,395. Jack T. Thurston and Donald W. Kaiser (to American Cyanamid Co.).

Preparing organosilicon halide by reaction between a hydrocarbon halide and the silicon component of a solid, porous contact mass obtained by firing under reducing conditions a mixture of powdered silicon and a powdered metallic catalyst. No. 453,409. Eugene G. Rochow and Winton I. Patnode (to Canadian General Electric Co., Ltd.).

In hydrolyzing a mixture of silicon halides including methyl silicon halides and containing a sufficient number of halogen atoms attached directly to silicon to form insoluble gels when mixed with water, the steps which comprise dissolving said mixture in an unsymmetrical ketone selected from the class consisting of methyl ethyl, methyl propyl, methyl isopropyl, methyl isobutyl, and methyl amyl ketones, and slowly adding to a hydrolysis medium consisting of liquid water. No. 453,410. James Marsden (to Canadian General Electric Co.).

Preparing an organo-silicon by introducing a powdered mixture of silicon and a metal catalyst into a hot reaction zone, and fluidizing the powder in the reaction zone with a hydrocarbon compound capable of reacting

with the silicon to form an organo-silicon compound. No. 453,418. Charles E. Reed and Jerome T. Coe (to Canadian General Electric Co.).

Catalytic dehydrogenation of isopropylbenzene by passing isopropylbenzene with steam over an oxide of vanadium. No. 453,473. Herbert M. Stanley and Francis E. Salt (to Distillers Co., Ltd.).

Production of toluol. No. 453,532. George Edward Liedholm and Frank M. McMillan (to Shell Development Co.).

Production of toluol. No. 453,533. Frank M. McMillan and George Edward Liedholm (to Shell Development Co.).

Rearranging crotyl alcohol to methyl vinyl carbinol by heating crotyl alcohol with an aqueous solution of sulphuric acid. No. 453,534. George W. Hearne and Donald S. La France (to Shell Development Co.).

Halogenation of unsaturated organic compounds by contacting an unsaturated compound with an adsorptive alumina predominating in gamma alumina and alpha-alumina monohydrate, and an effective amount of a solid metal halide of a metal of variable valence. No. 453,537. George W. Hearne (to Shell Development Co.).

Production of neohexane which comprises isomerizing an open chain hexane devoid of a quaternary carbon atom. No. 453,540. Chester C. Crawford, William E. Ross and Sumner H. McAllister (to Shell Development Co.).

In a process for effecting abnormal addition of hydrogen bromide to propylene with respect to addition according to Markownikoff's rule, the steps of adding bromo-acetone to the reaction mass, and effecting the reaction in the dark. No. 453,541. Frederick Rust and William E. Vaughan (to Shell Development Co.).

Production of a saturated trihydric alcohol by reacting an unsaturated monohydric alcohol with hydrogen peroxide in the presence of water and a tungstic acid. No. 453,542. Ingolfur Bergsteinsson (to Shell Development Co.).

Hydroxylation of an unsaturated organic compound containing an olefinic linkage by treating with a peroxide in the presence of a diluent and a carboxylic acid selected from the group consisting of formic acid, aliphatic polycarboxylic hydroxy acids and aliphatic halo-substituted carboxylic acids. No. 453,543. Ingolfur Bergsteinsson, Theodore W. Evans and James R. Scheibill (to Shell Development Co.).

Production of trimethylene glycol from acrolein by hydrating acrolein with an aqueous solution containing sulphuric acid, reacting the resulting reaction products with hydrogen in the presence of a Raney nickel catalyst. No. 453,545. Lewis F. Hatch and Theodore W. Evans (to Shell Development Co.).

Production of 3,5-dimethyl aniline and symmetrical collidine from isophorone by mixing isophorone vapors with ammonia, over a solid catalyst essentially comprising an activated bauxite. No. 453,546. Seaver A. Ballard and De Loss E. Winkler (to Shell Development Co.).

Conversion of olefines into aromatic liquid products with a higher number of carbon atoms by subjecting to the action of a catalyst selected from the group consisting of the oxides of zirconium, hafnium, thorium, cerium, and of metals of the rare earths and mixtures containing a plurality of these bodies. No. 453,615. Charles Weizmann.

In the manufacture of styrene and ethylbenzene the process which comprises passing butylene through a finely divided metal hydrogenating-dehydrogenating catalyst. No. 453,616. Charles Weizmann.

In the manufacture of phenyl o-phenoxy-benzoate from crude diphenyl carbonate containing iron impurities, the improvement which comprises

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separating iron impurities prior to effecting said rearrangement. No. 453,620. John H. Pearson and Berndt W. Hammaren (to Allied Chemical & Dye Corp.).

Preparing guanil sulphonic acid by heating guanil urea sulphamate until ammonia is evolved and recovering guanil urea sulphonic acid. No. 453,624. William H. Hill (to American Cyanamid Co.).

Preparing esters of acetic acid by passing a mixture of an ester of citric acid, acetic anhydride and an acetylation catalyst through a reaction zone to effect acetylation of the citric acid ester and then passing the product through a reaction zone to effect a deacetylation, thereby producing an acetic acid ester together with gaseous acetic acid. No. 453,625. Philip M. Kirk (to American Cyanamid Co.).

Preparing α -amino- γ -alkoxybutyric acids by hydrolyzing a 1-alkoxy-3-phthalimidopropane-3,3-dicarboxylic acid. No. 453,626. Quintin P. Cole and Richard O. Robin (to American Cyanamid Co.).

Producing hydrazinylamide by bringing together ethylene cyanohydrin and an aqueous alkaline solution and recovering the hydrazinylamide. No. 453,627. Myrl Lichtenwalter and Oscar F. Wiedeman (to American Cyanamid Co.).

Recovering HCN substantially free from H_2S from fuel gas comprising, absorbing HCN and H_2S by means of an aqueous scrubbing liquid, stripping HCN and H_2S therefrom and passing the stripped gases to a selective absorbing zone, supplying an absorbent liquid to absorb the HCN and at most a small amount of H_2S , rectifying the absorbent solution while acidified and returning overhead vapors containing the incidentally absorbed H_2S and at most a minor quantity of HCN to the selective absorption zone, withdrawing absorbent liquid containing HCN from the rectification, distilling HCN therefrom. No. 453,685. John Mitchell, William H. Hill and Herbert Arthur Gollmar (to Koppers Co., Inc.).

Zinc salt of di(methylcyclohexyl) dithiophosphate. No. 453,688. Peter A. Asseff (to The Lubrizol Corp.).

Sodio-formyl derivative of β -ethoxy-propionic-ethyl ester. No. 453,713. Robert R. Williams and Joseph K. Cline (to Research Corp.).

In a process for isomerizing butane in the vapor phase with a supported aluminum chloride catalyst, the step of continuously passing vapors of normal butane in contact with the catalyst and immediately thereafter with an adsorptive alumina, whereby aluminum chloride vapors are substantially adsorbed. No. 453,718. Martin de Simo and Frank M. McMillan (to Shell Development Co.).

Production of isophorone by continuously bringing acetone into contact in the liquid phase with an aqueous solution containing an alkali metal hydroxide. No. 453,720. Seaver A. Ballard and Vernon E. Haury (to Shell Development Co.).

Freeing isophorone from mesityl oxide and diacetone alcohol by commingling with aqueous sodium hydroxide solution in producing isophorone by condensing acetone. No. 453,721. Sumner H. McAllister and William A. Bailey, Jr. (to Shell Development Co.).

Synthesis of aromatic hydrocarbons by catalytic cyclization-dehydrogenation by contacting an open chain hydrocarbon having from 6 to 12 carbon atoms with a catalyst comprising chromium oxide supported upon an alumina carrier. No. 453,722. Bernard S. Greensfelder and Raymond C. Archibald (to Shell Development Co.).

Normally liquid perylene mono-sulphone. No. 453,723. Rupert C. Morris and Harry de V. Finch (to Shell Development Co.).

Stabilizing 2-chlorobutene-2 by adding methyl glycerol ether. No. 453,724. Rupert C. Morris and Edward C. Shokal (to Shell Development Co.).

Composition of matter comprising a halo-butene containing a halogen atom linked to an unsaturated carbon atom and a stabilizing quantity of a lime slurry. No. 453,725. Rupert C. Morris and Edward C. Shokal (to Shell Development Co.).

2-chlorobutene-2 containing a stabilizing quantity of a quinone. No. 453,726. Rupert C. Morris and Edward C. Shokal (to Shell Development Co.).

Alpha, beta dichloroacrylophenone. No. 453,737. Joy Gabriel Lichty (to Wingfoot Corp.).

*Packaging

Canadian

Airtight, vacuum package, the walls being composed of a laminated sheet which is a metal foil on the exterior and rubber hydrochloride film on the interior. No. 453,742. Albert B. Cluwan (to Wingfoot Corp.).

Double wall container, both walls being composed essentially of rubber hydrochloride. No. 453,743. James E. Snyder (to Wingfoot Corp.).

*Paper and Pulp

Wrapping tissue comprising an organic, synthetic, film-forming material and a moistureproof coating comprising ethylene-1,3-dioxolane copolymer. No. 2,456,387. Charles W. Cooper (to E. I. du Pont de Nemours & Co.).

Canadian

Paper comprising substantially unhydrated cellulose fibres bonded with a hydroxy alkyl cellulose. No. 453,730. Donald Robert Erickson.

*Petroleum

Alkylation of paraffins in presence of hydrofluoric acid. No. 2,455,003. Frederick E. Frey (to Phillips Petroleum Co.).

Eliminating sulphur from liquid hydrocarbons by treating with cuprous naphthenate. No. 2,455,061. Charles O. Hoover (to Air Reduction Co., Inc.).

Producing a solvent having a low odor intensity and controlled solvent power from product from hydrofluoric acid alkylation of a low-boiling isoparaffin with a short chain olefin. No. 2,455,601. Lloyd C. Morris (to Phillips Petroleum Co.).

Producing moisture-free, odorless petroleum wax by blowing molten wax with air until substantially free of moisture, introducing a small amount of ammonia sufficient to remove the rancid odor developed as a result of the aforesaid air-blowing. No. 2,455,670. Francis M. Graves (to Socony-Vacuum Oil Co., Inc.).

Distilling an acid-treated mineral oil by adding 90-95% of the stoichiometric quantity of caustic alkali necessary to neutralize any acid reacting substance during the distillation together with a naphthenic acid soap. No. 2,455,679. Minor C. K. Jones and Edward C. Eulhardt (to Standard Oil Development Co.).

Catalytic conversion of hydrocarbons. No. 2,455,915. Walter H. Borcherting (to M. W. Kellogg Co.).

Catalytic cracking of hydrocarbon oils. No. 2,456,035. Burle F. Wobker (to Phillips Petroleum Co.).

Conversion of hydrocarbons in the presence of a catalyst and calcium oxide together with steam and/or carbon dioxide. No. 2,456,072. Milton M. Marisic (to Pure Oil Co.).

Recovering olefins from a hydrocarbon stream with sulfuric acid. No. 2,456,260. Arthur A. Draeger (to Standard Oil Development Co.).

Conversion of hydrocarbon oils with finely divided catalyst. No. 2,456,306. Edward W. S. Nicholson (to Standard Oil Development Co.).

Prevention of siliceous deposits in hydrocarbon conversion processes in the presence of a hydrofluoric acid catalyst. No. 2,456,348. Paul M. Waddill (to Phillips Petroleum Co.).

Catalytic conversion of hydrocarbons with aluminum chloride. No. 2,456,557. Adam Dydzyszynski (to Shell Development Co.).

Conversion of hydrocarbons. No. 2,456,715. Frederick W. Leffer (to Universal Oil Products Co.).

Hydrocarbon coking. No. 2,456,796. A. H. Schutte (to Lummus Co.).

Producing a sulfur-free high grade lubricant from bituminous schists. No. 2,457,457. Jean Leon Maurice Frejaques (to Compagnie de Produits Chimiques et Electrometallurgiques Alais, Froges et Camarque).

Prefractionation of hydrocarbon alkylate to eliminate propane. No. 2,457,564. Ludwig Kniel (to Lummus Co.).

Breaking water-in-oil emulsions comprising mixing with a non-resinous reaction product of a mineral acid and an oil formed by reacting a secondary aliphatic amine free from acidic groups, an alkylated phenol free from acidic groups, and selected from the group consisting of those having an active position ortho to a nuclear hydroxy group, and those having an active position para to a nuclear hydroxy group, and an aldehyde. No. 2,457,634. Donald C. Bond and Michael Savoy (to Pure Oil Co.).

Regenerating aqueous alkali solution used to extract weakly acidic sulfur compounds from hydrocarbon fluids comprising contacting said solution with gas containing free oxygen in the presence of an added phenolic substance which is less effective than hydroquinone as an oxidation catalyst. No. 2,457,635. Donald C. Bond and Michael Savoy (to Pure Oil Co.).

Canadian

Process for the dehydration of a petroleum tar-water emulsion. No. 543,054. Horace M. Weir (to United Gas Improvement Co.).

Process for the dehydration of a petroleum tar emulsion. No. 453,055. Edwin L. Hall and Howard R. Batchelder (to United Gas Improvement Co.).

Electric process for desalting mineral oil. No. 453,309. Edmund I. Bailey (to Petrolite Corp., Ltd.).

Separating a normally gaseous hydrocarbon mixture containing a substantial amount of SO_2 to produce separate hydrocarbon and SO_2 fractions. No. 453,531. Lewis F. Hatch (to Shell Development Co.).

Catalytic alkylation process in the presence of a liquid mixture of a complex double compound of anhydrous aluminum chloride and a hydrogen halide. No. 453,536. William E. Ross, John Anderson and Sumner H. McAllister (to Shell Development Co.).

Desulphurization of hydrocarbon oils. No. 453,538. Lawrence L. Lovell, Parker Erwin Malson and Louis Frank Buillion (to Shell Development Co.).

Sweetening sour hydrocarbon oil containing mercaptans by treating with a copper catalyst. No. 453,539. Lawrence L. Lovell and Louis F. Buillion (to Shell Development Co.).

Cracking hydrocarbon oils by vaporizing, conducting the oil vapors to a zone containing a dense suspension of powdered inert material, which is at a higher temperature than the entering vapors. No. 453,937. Charles E. Hemminger (to Standard Oil Development Co.).

*Photographic

Developing a colored image in a silver halide emulsion layer by incorporating a coupler compound, p-HO-R-N=N-R' where R is an aromatic nucleus selected from the class consisting of nuclei of the benzene and naphthalene series, said nucleus having the azo group and the hydroxyl group para to each other, and R' is selected from the class consisting of aromatic and heterocyclic radicals, and said coupler compound contains no reactive phenolic hydroxyl group other than that to which the azo group is attached, exposing said layer and developing it with a primary aromatic amino developing agent, thereby splitting off the -N=N-R' group in said coupler compound and coupling said compound at the point of splitting with the oxidation product of the primary aromatic amino developing agent to form a dye image. No. 2,455,169. Dudley B. Glass, Paul W. Vittum and Arnold Weissberger (to Eastman Kodak Co.).

Preparing photographic products from polyvinyl alcohol photographic emulsions by mixing a heavy metal nitrate, ferric nitrate and uranyl nitrate, coating and fuming the coating while wet with a volatile nitrogen base from the group consisting of ammonia, methylamine, and ethylamine whereby the emulsion is set to a rigid gel. No. 2,455,936. Wesley G. Lowe (to Eastman Kodak Co.).

Diazotype light-sensitive materials. No. 2,456,514. Derland Johnston (to Charles Brunning Co., Inc.).

*Polymers

Polymeric organo-silicon oxide having on the average less than 2 organic radicals per silicon atom, the organic substituents of said oxide being selected from the class consisting of alkyl radicals of 1 to 3 carbon atoms and phenyl radicals, and a minor proportion of boric oxide. No. 2,306,060. Rob Roy McGregor and Earl Leathan Warrick (to Corning Glass Works).

Fibrous tape impregnated with polystyrene, rubber, polyisobutylene, polyethylene and monostyrene. No. 2,306,062. Archibald Alan New, Stanley George Foord and Dudley Robert Beckwith (to International Standard Electric Corp.).

Making a solid, elastic, curable methylpolysiloxane by contacting a liquid polymeric dimethylsiloxane with the liquid methylpolysiloxane of a sulfonyl halide. No. 2,454,759. Moyer M. Stafford (to General Electric Co.).

Making urea-aldehyde resin dispersions. No. 2,454,785. Loy S. Engle, Edward Sheridan and Earl K. Fischer (to Interchemical Corp.).

Polymerizing rosin by treating with a catalytic material selected from the group consisting of cobaltous chloride and cobaltous bromide. No. 2,454,795. Burt L. Hampton (to Glidden Co.).

Polymerizing rosin by treating rosin with a catalytic material selected from the group consisting of the chlorides and bromides of antimony, in combination with a small amount of free hydrogenhalide selected

* U. S. Patents from Vol. 616, No. 5. Vol. 617, Nos. 1, 2, 3, 4. Canadian from Nov. 30-Dec. 28.

- from the group consisting of hydrogen chloride and hydrogen bromide. No. 2,454,796. Burt L. Hampton (to Glidden Co.).
- Plasticizing polyvinyl chloride compositions. No. 2,445,042. Leslie Budworth Morgan, Paul Russell, Austin Atkinson Gibson, Robert Arbutnot Kinnear and Reginald Grime Heyes (to Imperial Chemical Industries Ltd.).
- Making thermoplastic styrene resin insoluble in aliphatic hydrocarbon solvents and soluble in aromatic hydrocarbon solvents by bringing finely divided weakly acid catalyst clay into reactive contact with a styrene liquid. No. 2,455,225. Samuel G. Burroughs (to Pennsylvania Industrial Chemical Corp.).
- Plastic composition comprising a polyvinyl acetal resin and an ester: $X-OOC-R-COO-CH_2-COO-X$ in which R is an alkylene radical having from 2 to 4 carbon atoms and X is an alkyl radical having from 1 to 8 carbon atoms. No. 2,455,301. Harry R. Gamrath (to Monsanto Chemical Co.).
- Copolymers of fumarodinitrile and styrenes. No. 2,455,342. Raymond B. Seymour (to Monsanto Chemical Co.).
- In preparing a synthetic amide-formaldehyde resin by adding di(tetrahydrofuryl)ethyl carbinol. No. 2,455,392. Eric John Gray Bailey, Francis M. Page and John C. McGowan (to Imperial Chemical Industries Ltd.).
- Preparing a stable aqueous dispersion of polyvinyl butyral resin by reacting a polyvinyl alcohol with butyraldehyde in the presence of a volatile solvent for polyvinyl, butyral, a plasticizer, a strong acid catalyst and an organic acid capable of forming a soap. No. 2,455,402. William B. Bromley, Jr. (to Shawinigan Resins Corp.).
- Polyvinyl chloride resin stabilized with ortho-sulfobenzimide. No. 2,455,611. Russell H. Schlattmann (to Monsanto Chemical Co.).
- Polyvinyl chloride resin stabilized with the alkali metal salts and the alkaline earth metal salts of ortho-sulfobenzimide. No. 2,455,612. Russell H. Schlattmann (to Monsanto Chemical Co.).
- Polyvinyl chloride resin stabilized with the dialkyl tin salts of ortho-sulfobenzimide. No. 2,455,613. Russell H. Schlattmann (to Monsanto Chemical Co.).
- Polyvinyl chloride resin stabilized with the lead salt of ortho-sulfobenzimide. No. 2,455,614. Russell H. Schlattmann (to Monsanto Chemical Co.).
- Nuclear halogenated 4,4'-bis-(alkenyl carbonate) diphenyl alkanes and polymers thereof. No. 2,455,652. James A. Bralley and Frank B. Pope (to B. F. Goodrich Co.).
- Polymerizing an unsaturated having at least one ethylenic double linkage and from 4 to 14 carbon atoms per molecule by contact with a Friedel-Crafts catalyst. No. 2,455,665. William W. Ford and Fred D. Thiel (to Standard Oil Development Co.).
- Copolymer of vinylidene chloride, vinyl chloride, and 2-hydroxy-5-chlorobenzophenone-2'-carboxylic acid to stabilize the polymer against the injurious effects of light. No. 2,455,674. Carl B. Havens (to Dow Chemical Co.).
- Latex of 2-chloro butadiene-1,3, magnesium oxide, zinc oxide, and liquid heptylated diphenylamine. No. 2,455,697. Paul F. Niessen (to B. F. Goodrich Co.).
- Polymeric alcohol by heating polymer of an acetal of a saturated aliphatic monoaldehyde with 6 carbon atoms and an unsaturated monoaldehyde alcohol having from 3 to 9 carbon atoms with an olefinic bond between the beta and gamma carbon atoms in the presence of a dilute aqueous solution of a strong mineral acid. No. 2,455,722. David E. Adelson and Harold F. Gray, Jr. (to Shell Development Co.).
- Resinous condensates of β -propiolactone and polyhydroxy compounds. No. 2,455,731. John R. Caldwell (to Eastman Kodak Co.).
- Inhibiting the polymerization of a compound of the group consisting of styrene and polymerizable ring chlorinated styrenes by incorporating a 2,5-dialkoxycyclohexanone. No. 2,455,745. Edwin R. Erickson (to Mathieson Chemical Corp.).
- Styrene and polymerizable ring chlorinated styrenes having dissolved therein as a stabilizer a 2,5-disubstituted hydroquinone in which the substituents are selected from the group consisting of alkyl and aralkyl radicals. No. 2,455,746. Edwin R. Erickson (to Mathieson Chemical Corp.).
- Copolymers of 1-acyloxy-1,3-butadienes and acrylonitrile. No. 2,455,778. William O. Kenyon and Cornelius C. Unruh (to Eastman Kodak Co.).
- Wax-compatible ethylene glycol-tetrachlorophthalate resins. No. 2,455,873. Birger W. Nordland and William E. Cass (to General Electric Co.).
- Organic lead salt stabilizers for vinyl halide resins. No. 2,455,879. Moyer M. Safford (to General Electric Co.).
- Lead silanolate stabilizers for vinyl halide resins. No. 2,455,880. Moyer M. Safford and Edwin L. Mincher (to General Electric Co.).
- An improved polystyrene composition comprising polystyrene in admixture with a hydrocarbon fraction derived from a high boiling mineral oil fraction. No. 2,455,990. Eric William Musther Pawcett, Albert Millien, and Norman M. Moberg (to Anglo-Iranian Oil Co. Ltd.).
- Curing a saturated ethylene polymer by forming a homogenous blend of said polymer with an inorganic peroxy compound and a monocarboxylic acid having at least 4 carbon atoms and heating. No. 2,455,910. Witty Lysle Alderson (to E. I. du Pont de Nemours & Co.).
- Rapid, low temperature-curing polychloroprene composition comprising a volatile organic solvent solution of the polychloroprene containing a heavy metal xanthate derived from an unsubstituted aliphatic alcohol containing from 1 to 8 carbon atoms. No. 2,455,911. Louis S. Bake (to E. I. du Pont de Nemours & Co.).
- Solid polymerized tetramethylethylene oxide. No. 2,455,912. Theodor L. Cairns and Robert M. Joyce, Jr. (to E. I. du Pont de Nemours & Co.).
- Converting high molecular weight polymers of dimethyl silicone to low molecular polymers by heating in the substantial absence of oxygen. No. 2,455,999. James Franklin Hyde (to Corning Glass Works).
- Cation-exchange resins prepared by condensing sulfolipthalic anhydride and xylene. No. 2,456,085. Stanley P. Rowland (to Rohm & Haas Co.).
- Urea-formaldehyde composition. No. 2,456,095. Henry A. Walter (to Libbey-Owens-Ford Glass Co.).
- Continuous process for the manufacture of synthetic resins. No. 2,456,192. Harold G. Houlton (to Gardler Corp.).
- Composition of matter comprising a chlorine-containing vinyl resin of 14 to 75% by weight chlorine in which the chlorine is attached directly to the carbon atoms in the polymer chain, from 1 to 6% by weight, based on said resin, of a tri-(2-alkenyl) phosphate having 3 to 14 carbons in each alkenyl group, and from 0.1 to 5.0% by weight based on said resin, of a 1,2-epoxy compound. No. 2,456,216. Henry J. Richter (to E. I. du Pont de Nemours & Co.).
- Dispersing a solid polymerization catalyst in a polymerizable thermosetting resin sirup. No. 2,456,228. Welcome I. Weaver (to Libbey-Owens-Ford Glass Co.).
- Chlorine-containing vinyl resins stabilized with a tri-(2-alkenyl)-phosphate. No. 2,456,231. Richard H. Wiley (to E. I. du Pont de Nemours & Co.).
- Emulsion polymerization of 2-chloro-1,3-butadiene in the presence of trialkyl-diamino-diphenyl methanes. No. 2,456,243. Robert S. Barrows (to E. I. du Pont de Nemours & Co.).
- Polymeric trifluoroethylene. No. 2,456,255. Donald D. Coffman and Thomas A. Ford (to E. I. du Pont de Nemours & Co.).
- Polymerization process comprising mixing liquefied isobutylene, liquefied ethylene and zinc stearate and polymerizing the mixture by the application of a Friedel-Crafts active halide catalyst. No. 2,456,265. Per K. Frolich (to Jasco, Inc.).
- Reaction product of N-substituted polyamides with hydroxylated materials and process for obtaining same. No. 2,456,271. Boynton Graham (to E. I. du Pont de Nemours & Co.).
- Saturated linear polyesters of mercaptocarboxylic acids with dihydric alcohols. No. 2,456,314. Bert Carlton Pratt (to E. I. du Pont de Nemours & Co.).
- Catalytic polymerization of olefinic hydrocarbons in the presence of a solid phosphorus acid catalyst. No. 2,456,338. John J. Stadtherr (to Pure Oil Co.).
- Polyamides plasticized with a mixture of phenol and ester type plasticizers. No. 2,456,344. Gordon T. Vaala (to E. I. du Pont de Nemours & Co.).
- Copolymers of iso-olefins with thiophene sulfones by application of a Friedel-Crafts catalyst. No. 2,456,354. David W. Young (to Standard Oil Development Co.).
- Making resins by reacting at an elevated temperature at least one polymerizable material selected from the group consisting of styrene, coumarone, indene and their homologs, urea or thiourea, phenolic material of the tar-acid group, and a member of the group consisting of formaldehyde and acetaldehyde in the presence of an acid catalyst and a solvent for the resin. No. 2,456,357. Harry L. Allen and Earl G. Kerr (to Allied Chemical & Dye Corp.).
- Making resins by reacting at an elevated temperature at least one polymerizable material selected from the group consisting of indene, coumarone, styrene and their homologs, maleic anhydride, phenolic material of the tar-acid group and formaldehyde. No. 2,456,358. Harry L. Allen and Earl G. Kerr (to Allied Chemical & Dye Corp.).
- In polymerizing an acrylonitrile composition the improvement which comprises carrying out the polymerization in the presence of diethyglycidol. No. 2,456,360. Harold Wilfred Arnold (to E. I. du Pont de Nemours & Co.).
- Plastic composition comprising a polyvinyl acetal and a plasticizer comprising a primary alkyl acyl glycolate. No. 2,456,366. Bozetch C. Bren and Jesse O. White (to E. I. du Pont de Nemours & Co.).
- Electric capacitor adapted for operation at a high temperature comprising cooperating metal armatures, an interposed absorbent space and solid, resinsified diallyl phthalate. No. 2,456,381. Frank M. Clark (to General Electric Co.).
- Copolymer of cyclohexyl alpha chloroacrylate and butadiene-1,3. No. 2,456,382. Albert M. Clifford (to Wingfoot Corp.).
- Polyvinyl acetal resin plasticized with a terphenyl. No. 2,456,413. Richard H. Hunt (to Monsanto Chemical Co.).
- Polyallyl amine and related polymeric amines. No. 2,456,428. James H. Parker (to Shell Development Co.).
- Butadiene-acrylonitrile copolymer mixed with vinylidene chloride-acrylonitrile copolymer. No. 2,456,454. Ralph J. Signer (to Visking Corp.).
- Stabilization of polyvinyl butyral resins with a saturated aliphatic amine containing from 2 to 6 carbon atoms, inclusive, and having 2 primary amino groups. No. 2,456,462. Gelu S. Stamatoff (to E. I. du Pont de Nemours & Co.).
- Lubricant composed of a mixture of liquid polymers of dialkyl silicones in which the alkyl groups each have at least 2 carbon atoms substantially free of monoalkyl and trialkyl silicone derivatives. No. 2,456,496. James G. Ford and Robert N. Wenzel (to Westinghouse Electric Corp.).
- Mass polymerization of aromatic vinyl compounds taken from the group consisting of styrene, para methyl styrene, para ethyl styrene, ortho chlorostyrene, meta chlorostyrene, para chlorostyrene, 2,5-dichlorostyrene, 3,4-dichlorostyrene, vinyl diphenyl and vinyl naphthalene. No. 2,456,558. Sanford E. Glick (to Monsanto Chemical Co.).
- Stabilized vinyl resin having mixed therewith an amount of tri-para-chlorophenyl stibine effective to increase the light-stability. No. 2,456,565. Harold F. Park (to Monsanto Chemical Co.).
- Extruding polytetrafluoroethylene and coating articles therewith. No. 2,456,621. Azro Jack Cheney, Jr. (to E. I. du Pont de Nemours & Co.).
- Thermosetting resin by mixing resorcinol and a partial condensation-reaction product derived from the condensation of furfuryl alcohol with itself. No. 2,456,628. Andrew P. Dunlop and Edward A. Reineck (to Quaker Oats Co.).
- Preparing a tung oil-maleic anhydride adduct, esterifying with mannitol and then reacting sulfuric chloride with the resulting infusible gelatinous ester. No. 2,456,629. Gilbert B. Gehrenbeck (to Minnesota Mining & Mfg. Co.).
- Preparing an unsaturated resin which comprises copolymerizing an alkyl acrylate of the formula $CH_2=CHCOOR'$ in which R' is a radical having at least one olefinic double bond and at least 4 carbon atoms in its open olefinic chain, with a lower alkyl ester of acrylic acid in the presence of a polymerization regulator taken from the group consisting of mercaptans and carbon tetrachloride. No. 2,456,647. Chessie E. Rehberg and Charles H. Fisher (to U. S. A. by Sec. of Agriculture).
- Impregnating composition comprising coumarone indene resin, ethyl acetamide, and ethyl cellulose. No. 2,456,717. William P. Lowden (to Radio Corp. of America).
- Copolymeric organo-siloxane comprising hydrocarbon-substituted silicon units which correspond to the formulae $RSi\equiv$ and $R', R'', R''' Si-$, respectively, and which are interconnected by oxygen atoms through siloxane linkages, where R, R', R'' and R''' are monovalent hydrocarbon radicals attached to silicon through carbon-silicon linkages. No. 2,456,783. James Franklin Hyde (to Corning Glass Works).
- Composition capable of curing to a water resistant resin comprising aniline formaldehyde resin, a poly-glycol dichloride selected from the group consisting of di-, tri-, tetra- and penta-, poly-glycol dichlorides, and a metal selected from the group consisting of lead, iron, zinc and copper, the metal being capable of reacting with the HCl which, during subsequent heating, becomes bonded to the N atoms of the amino groups, the Cl being derived from the poly-glycol dichloride, to form metal chloride. No. 2,456,919. Loring Coes, Jr. (to Norton Co.).
- Composition capable of curing to a water resistant resin comprising aniline formaldehyde resin, a poly-glycol dichloride selected from the group consisting of di-, tri-, tetra-, and penta-, poly-glycol dichlorides, and a metal oxide selected from the group consisting of zinc, lead and cobalt oxides, the metal oxide being capable of reacting with the HCl which, during subsequent heating, becomes bonded to the N atoms of the amino groups, the Cl being derived from the poly-glycol dichloride, to form metal chloride and water. No. 2,456,920. Loring Coes, Jr. (to Norton Co.).
- Composition capable of curing to a water resistant resin comprising aniline formaldehyde resin, a poly-glycol dichloride selected from the group consisting of di-, tri-, tetra-, and penta-, poly-glycol dichlorides

- and a salt of a weak acid selected from the group consisting of sodium silicate and zinc borate, the salt being capable of reacting with the HCl which during subsequent heating of composition, becomes bonded to the N atoms of the amino groups, the Cl being derived from the poly-glycol dichloride, to form metal chloride and weak acid. No. 2,456,921. Loring Coes, Jr. (to Norton Co.).
- A polymerized vinyl resin containing predominantly combined vinyl chloride, a basic lead salt and an ester selected from the group consisting of monoalkyl fumarates and monoalkyl malates wherein the alkyl substituents contain at least 1 and not more than 12 carbon atoms. No. 2,457,035. Joseph Raymond Darby (to Monsanto Chemical Co.).
- Compound for sealing mechanical joints comprising a gel of fully polymerized, thermosetting, reaction product of phenol-formaldehyde condensation dispersed in an oily liquid of low vapor pressure chosen from the group consisting of tri-o-cresyl phosphate, tri-octyl phosphate, and di-butyl phthalate; and a filler. No. 2,457,087. John D. Morgan and Russell E. Lowe (to Cities Service Oil Co.).
- Polymerizing propylene in the presence of a solid polymerization catalyst containing a phosphoric acid catalyst compound. No. 2,457,146. Henry W. Grote, Robert L. Swoope and Charles S. Brearley, Jr. (to Universal Oil Products Co.).
- Phenol-aldehyde sealing agent. No. 2,457,160. Stewart S. Kurtz, Jr., and James S. Sweely (to Sun Oil Co.).
- Thermosetting resinous composition comprising formaldehyde-modified polymethylene-diamine-carbon bisulfide reaction product, having the formula $NH_2(CH_2)_nNH_2$ in which n has a value of from 3 to 10. No. 2,457,209. William B. Clark (to E. I. du Pont de Nemours & Co.).
- Crystalline homopolymers of 1,3-dioxolane. No. 2,457,224. William F. Gresham (to E. I. du Pont de Nemours & Co.).
- Fractionation of polymeric ethylene by dissolving a solid polymer of ethylene in ethylene gas at a pressure in excess of 500 atmospheres and a temperature between 50 and 350° C., cooling the resulting mixture and thereafter blowing down to atmospheric pressure whereby polymers of ethylene are obtained in two solid phases. No. 2,457,238. Edward Hunter and Raymond B. Richards (to Imperial Chemical Industries Ltd.).
- Polyvinyl acetal resins. No. 2,457,261. George Osman Morrison, Frederick Pettit Lossing, Albert Harold Heatley and Joseph Frederic Leo Marcel Germain (to Shawinigan Chemicals Ltd.).
- In a process for modifying monoolefin hydrocarbon/carbon monoxide polymers, said monoolefin being an acyclic hydrocarbon containing from 2 to 4 carbon atoms per molecule, the steps which comprise reacting the said polymer with a basic material consisting of basic alkali metal and basic alkaline earth metal compounds, in an organic medium, continuing the resulting reaction until a substantial but incomplete, deoxygenation of the polymer has occurred, diluting and thereafter precipitating the resulting alkali treated polymer by acidifying. No. 2,457,271. Paul S. Pinkney (to E. I. du Pont de Nemours & Co.).
- Modifying monoolefin/carbon monoxide polymers by reacting a monoolefin hydrocarbon/carbon monoxide polymer with a basic compound. No. 2,457,279. Samuel L. Scott (to E. I. du Pont de Nemours & Co.).
- Lower polymers of glycidyl sorbate. No. 2,457,300. Albert Bernard Boese, Jr. (to Carbide & Carbon Chemicals Corp.).
- Manufacture of polycyclic unsaturated synthetic resins by heating hexadiene-1:5 until a polymer of melting point has been formed and then heating for at least 3 hours by means of a phenol as heating liquid under non-oxidizing conditions. No. 2,457,306. Henry Dreyfus, deceased, by Claude Bonard (to Celanese Corp. of America).
- Polymers of 9,10-epoxyoctadecanone. No. 2,457,329. Daniel Swern and Geraldine N. Billen (to U. S. A. by Sec. of Agriculture).
- Resinous heat reaction product of an aminotriazine-aldehyde condensation product and a mononitro paraffin. No. 2,457,404. Milton J. Scott (to Monsanto Chemical Co.).
- Resinous heat reaction product of an aldehyde reactable aminotriazine, an aldehyde and a halogenated nitro-paraffin. No. 2,457,405. Milton J. Scott (to Monsanto Chemical Co.).
- Resinous heat reaction product of an aminotriazine-aldehyde condensation product and a compound taken from the group consisting of acyclic compounds having from 3 to 6 carbon atoms to which are attached one nitro group, from 1 to 2 halogen atoms, from 1 to 2 hydroxyl groups. No. 2,457,406. Milton J. Scott (to Monsanto Chemical Co.).
- Phenol-aldehyde reaction products. No. 2,457,493. Donald V. Redfern (to American-Marietta Co.).
- Waterproof plastic insulating composition consisting of a dehydrated asbestos fiber, a mineral lubricating oil and a water-insoluble soap of a mixture of distilled fatty acids having 16 to 18 carbon atoms and wool grease stearine. No. 2,457,518. James Alfred Bell (to Shell Development Co.).
- Treatment of chloromethyl-substituted polysiloxanes. No. 2,457,539. John R. Elliott and Robert H. Kriebel (to General Electric Co.).
- Polyvinyl esters and organo-boron compounds having the general formula $RB(OH)_2$ in which R is an organic radical joined to the boron atom through a carbon atom and is a member selected from the group consisting of an aliphatic hydrocarbon, an aromatic hydrocarbon, and the halogen, hydroxyl, and amino-substituted derivatives of said aliphatic and aromatic hydrocarbons. No. 2,457,603. Paul L. Salzberg and Frank K. Signaigo (to E. I. du Pont de Nemours & Co.).
- $HO(CH_2)_nR(CH_2)_m(COO)_nH$ wherein n is an integer from one to 100, R represents a six-sided carbocyclic of the formal C_6H_6 . No. 2,457,640. Herman A. Bruson and Warren D. Niederhauser (to Rohm & Haas Co.).
- Polymerizable composition consisting of styrene and a reaction product of diethylene glycol, maleic acid and linseed oil acids. No. 2,457,657. Sanford E. Glick (to Monsanto Chemical Co.).
- Polymerizing vinyl alkyl ethers by the action of gallium trichloride. No. 2,457,661. Frederick Grosser (to General Aniline & Film Corp.).
- Liquid organopolysiloxanes. No. 2,457,677. James Franklin Hyde (to Corning Glass Works).
- Thermoplastic resin comprising the condensation product of a dialkylol melamine and a para-substituted phenol. No. 2,457,738. Milton J. Scott (to Monsanto Chemical Co.).
- Interpolymer of styrene, an oil-soluble natural resin containing a free-carboxylic acid. No. 2,457,768. James A. Arvin and Wayne B. Gitchel (to Sherwin-Williams Co.).
- Resinous ester of a polyhydroxy alcohol and a copolymer of styrene and an oil soluble natural resin. No. 2,457,769. James A. Arvin and Wayne B. Gitchel (to Sherwin-Williams Co.).
- Canadian**
- Producing plastic compositions from a polyvinyl halide such as vinyl chloride or polyvinyl halide co-polymers such as vinyl chloride with vinyl acetate, methyl acrylate, vinylidene chloride or the like, in which hydrocarbons are used as plasticizers, partial plasticizers and/or fillers. No. 452,961. Eric William Musters, Fawcett and Eric Sylvester Narrautt (to Anglo-Canadian Oil Co. Ltd.).
- Treatment of linear polymers with formaldehyde or formaldehyde-liberating substance. No. 452,973. David Augustine Harper and Reginald John William Reynolds (to Canadian Industries Ltd.).
- Obtaining elastic nylon by heating nylon in essentially undrawn state in contact with an acidic catalyst, a volatile monohydric alcohol and formaldehyde. No. 452,974. John Richard Lewis, David McCreath and Reginald John William Reynolds (to Canadian Industries Ltd.).
- Polymeric masses comprising a polymerized alpha-hydroxy-carboxy-substituted acrylonitrile. No. 453,064. Albert M. Clifford (to Wingfoot Corp.).
- Copolymer of orthocyanostyrene and butadiene-1,3. No. 453,065. John Royer Long (to Wingfoot Corp.).
- Production of a synthetic resin by polymerizing a compound from the class consisting of styrene, aliphatic styrene and their nuclear lower alkyl substitution derivatives by heating in the presence of a peroxidic catalyst containing a radical of an unsaturated organic acid of the group consisting of crotonic and cinnamic acid. No. 453,158. Hanns Peter Staudinger (to Distillers Co. Ltd.).
- Acetone-soluble interpolymer of allyl acrylate and allyl alcohol, the carboxylic groups present in the interpolymer being in esterified form. No. 453,159. Robert Harvey Snyder (to Dominion Rubber Co., Ltd.).
- Polymeric vinylidene chloride in which the stabilizer is 2-hydroxy-5-chlorobenzophenone. No. 453,161. Thomas Houtman, Jr. (to Dow Chemical Co.).
- Stabilization of chloroethylene by the presence of metallic silicates during polymerization. No. 453,165. Claude Hudson Alexander (to B. F. Goodrich Co.).
- Polymeric composition. No. 453,251. Theodore A. TeGrotenhuis.
- For use in laminating plywood material an adhesive which includes a mixture of a partially reacted resin selected from the group consisting of the partially reacted phenol-aldehydes, urea-aldehydes, melamine-aldehydes, their homologues, derivatives and mixtures thereof and a compatible film forming material for imparting internal strength and augmenting adhesiveness and selected from the group consisting of high polymeric cellulose derivatives and the vinyl esters and alcohols and their copolymers. No. 453,289. Charles Leslie Weidner and Lascio Walter Eger (to Johnson & Johnson Ltd.).
- Making a polysiloxane resin by forming a solution of a mixture of dimethyldichlorosilane, methyltrichlorosilane and silicon tetrachloride in an inert hydrocarbon solvent and hydrolyzing by adding to a two-phase hydrolyzing medium comprising an inert aromatic hydrocarbon solvent, n-butanol and a quantity of water. No. 453,415. Robert O. Sauer (to Canadian General Electric Co.).
- Making polysiloxane resins by dissolving a mixture of methyl chlorosilanes in an aromatic hydrocarbon solvent and slowly adding the resultant solution to a two-phase hydrolysis medium comprising an aliphatic alcohol containing from 4 to 8 carbon atoms, an aromatic hydrocarbon solvent and an aqueous solution of hydrochloric acid. No. 453,422. James Marsden (to Canadian General Electric Co.).
- Modified methyl polysiloxane compositions. No. 453,427. Almy D. Coggeshall (to Canadian General Electric Co.).
- Manufacture of alkyl esters of alpha-chloroacrylic acid by reacting formaldehyde and polymers thereof with trichloroethylene in the presence of water and sulfuric acid adding an alkyl hydrogen sulphate and heating. No. 453,439. Alfred Mead (to Canadian Industries Ltd.).
- Improving the properties of an organic di-isocyanate modified polymer selected from the group consisting of polyesters and polyester-amides which comprises heating with a compound of the class consisting of formaldehyde and formaldehyde-liberating substances. No. 453,440. Bernard J. Haggood, David A. Harper, and Reginald J. W. Reynolds (to Canadian Industries Ltd.).
- Curing an organic di-isocyanate modified polymer selected from the group consisting of polyesters and polyester-amides by heating with para-formaldehyde in the presence of a halogenated naphthol. No. 453,441. David Augustine Harper and Henry Percy Wynne Huggill (to Canadian Industries Ltd.).
- An organic di-isocyanate modified polymer selected from the group consisting of polyesters and polyester-amides, a compound selected from the group consisting of formaldehyde and formaldehyde-liberating substances and a basic material which will neutralize acid. No. 453,442. Jack M. Buist, David A. Harper, Walter F. Smith and George N. Welding (to Canadian Industries Ltd.).
- In modifying low molecular weight linear polymers selected from the group consisting of polyesters and polyester-amides, by reaction with organic diisocyanates, the improvement of melting said polymers and mixing with an organic diisocyanate and subsequently heating. No. 453,443. David H. Coffey, James G. Cook and William H. G. Lake (to Canadian Industries Ltd.).
- In the process of curing an organic diisocyanate modified polymer selected from the group consisting of polyesters and polyester-amides of non-phenolic formaldehyde liberating substance and a curing catalyst, the improvement which comprises effecting the curing in the presence of a thermo-hardening phenol-formaldehyde condensation product derived by alkaline condensation from a phenol with more than 2 free positions ortho and para to the phenolic hydroxyl group. No. 453,444. Will Furness, Lyle E. Perrins and Walter F. Smith (to Canadian Industries Ltd.).
- Copolymer of a chlorine-containing ethenoid compound with an organic diester of endomethylene-tetrahydrothiophthalic acid. No. 453,474. Hanns Peter Staudinger and Cyril Alfred Brighton (to Distillers Co., Ltd.).
- Vulcanizing a copolymer of a conjugated diene hydrocarbon and an alpha-methylene nitrile in the presence of a vulcanizing agent comprising a bis(oxythiono) polysulphide. No. 453,503. Doran Earl Sausser (to B. F. Goodrich Co.).
- A polymerizable ester of (a) monomeric methacrylic acid and (b) a polymer of a monounsaturated monohydroxy lower aliphatic alcohol. No. 453,522. Irving Elkin Muskat and Maxwell Aaron Pollack (to Pittsburgh Plate Glass Co.).
- Production of a polyalkyl acetate by heating allyl acetate in the presence of a barium chloride. No. 453,547. David E. Adelson, Harold F. Gray, Jr., and Robert P. Ruh (to Shell Development Co.).
- Production of a polymer of a beta, gamma-olefinic alcohol by hydrolyzing a sole polymer of an ester of a beta, gamma-olefinic alcohol with an ortho acid of an element, selected from the class consisting of boron, silicon, aluminum, titanium, tin and germanium. No. 453,548. Seaver A. Ballard (to Shell Development Co.).
- Polyamide comprising the heat reaction product of ethylene diamine with carboxylic acids obtained from the polymerized methyl esters of turg oil. No. 453,626. Theodore F. Bradley (to American Cyanamid Co.).
- Polymerization of an aqueous emulsion containing butadiene-1,3 and styrene and a dimethylamine soap of a soap-forming monocarboxylic acid having 12 to 20 carbon atoms. No. 453,675. Leland Marion White (to International Latex Processes, Ltd.).
- Co-polymerizing an alkyl ester of acrylic acid and isoprene in an aqueous emulsion containing a caseinate and a peroxide catalyst. No. 453,714. Samuel M. Weisberg, Edwin G. Stimpson and Joseph Greenspan (to Sealtest, Inc.).
- Inhibiting undesirable polymerization of methyl isopropenyl ketone by

mixing with ammonia in the form of an aqueous ammonia solution. No. 453,719. Hans Dannenberg and David E. Adelson (to Shell Development Co.).

Color stable resin which comprises a polymer of vinyl chloride having incorporated therein formamide. No. 453,736. LaVerne Emerson Cheyney and Carl Ramsey Parks (to Wingfoot Corp.).

Reacting an acrylic acid monomer containing a single carboxyl group with one mol of a material selected from the group consisting of aliphatic and aromatic diisocyanates and aliphatic and aromatic diisothiocyanates. No. 453,738. Joy Gabriel Lichty and Nelson Vernard Seeger (to Wingfoot Corp.).

Vinyl halide resin capable of resisting discoloration upon heating which comprises a polymer of a vinyl halide and another polymerizable monolefinic compound containing a compound of the group consisting of amino-guanidine and salts of amino-guanidine. No. 453,739. Fred Ward Cox and James Mayrant Wallace, Jr. (to Wingfoot Corp.).

Vinyl chloride resin capable of resisting discoloration upon heating which comprises a copolymer of vinyl chloride and dialkyl fumarate, containing methyl guanidine nitrate. No. 453,740. Fred Ward Cox and James Mayrant Wallace, Jr. (to Wingfoot Corp.).

*Processes and Methods

Alkylation method. No. 2,454,869. Arthur R. Goldsby and Claude W. Watson (to Texas Co.).

Control of temperature in regeneration of solid hydrocarbon conversion catalysts. No. 2,454,901. Roy E. Vinyard, Wendell W. Roach and Bradley Skinner (to Phillips Petroleum Co.).

Drying hydrogel catalysts by distilling with butanol. No. 2,454,941. Jerry A. Pierce and Charles N. Kimberlin, Jr. (to Standard Oil Development Co.).

Preparation of spherical adsorbent particles. No. 2,454,942. Jerry A. Pierce and Charles N. Kimberlin, Jr. (to Standard Oil Development Co.).

Reducing disengaging height in fluidized powder systems. No. 2,455,561. George D. Creelman (to M. W. Kellogg Co.).

Extractive distillation process. No. 2,455,803. Gino J. Pierotti (to Shell Development Co.).

Fractionation in presence of radiant energy. No. 2,455,812. Carleton H. Schlesman (to Socony-Vacuum Oil Co., Inc.).

Hydrocarbon conversion process in the presence of a solid catalyst. No. 2,456,148. Davis Read, Jr. (to Universal Oil Products Co.).

Catalytically hydrogenating organic substances. No. 2,456,187. Henri Martin Guinot (to Les Usines De Melle Societe Anonyme).

Operation of a fluid catalytic conversion unit. No. 2,456,310. Franklin M. Orr (to Standard Oil Development Co.).

Drying finely divided materials while suspended in a gas. No. 2,456,674. Robert A. Caughey.

Apparatus for conducting reactions in the presence of a contact mass. No. 2,457,098. Ernest Utterback, Edward L. Sinclair and John A. Crowley, Jr. (to Socony-Vacuum Oil Co., Inc.).

Catalytic conversion system. No. 2,457,232. Robert J. Hengstebeck (to Standard Oil Co.).

Stripping of spent catalyst in a hydrocarbon conversion process. No. 2,457,255. Paul F. McElherne (to Standard Oil Co.).

Canadian

Method of operating film evaporators. No. 453,254. Curt Fredrik Rosenblad (to Aktiebolaget Rosenblads Patent).

Adsorption system. No. 453,470. Melvin A. Crosby and Edmund M. Velten (to Commonwealth Engineering Co. of Ohio).

*Rubbers

Vulcanizing rubber by heating rubber, and sulfur in the presence of 2-thiazylthiomethyl substituted melamine. No. 2,455,528. Raymond B. Seymour (to Monsanto Chemical Co.).

Adjusting the pH of synthetic elastomer latices with tetraalkanolammonium hydroxide, (HOCxH₂)_nNOH, in which x is one of the integers 2 and 3 and in each case is the same. No. 2,456,069. Herbert K. Livingston (to E. I. du Pont de Nemours & Co.).

Vulcanizing rubber in the presence of dihydro polycyclic p-hydroquinone. No. 2,456,154. Winfield Scott, deceased, by Ruth P. Scott (to Wingfoot Corp.).

Coagulating polychloroprene latex containing zinc oxide by treating with an aqueous solution comprising hydroxyacetic acid and hydrochloric acid. No. 2,456,539. David G. Slovin (to U. S. Rubber Co.).

Latex comprising an aqueous dispersion of an unmodified polymerization-cross-linked polymerization product of a liquid comprising butadiene and styrene and a polymerization product having relatively few cross links and a liquid comprising butadiene and styrene as main polymerizable ingredients. No. 2,457,097. Theodore A. Te Grotenhuis.

Incorporating into the vulcanizable isobutylene rubber mix containing sulfur and a vulcanization accelerator of the group consisting of thiuram sulfides and dithiocarbamates an N-nitroso-p-nitrosamine. No. 2,457,331. Joseph H. Trepagnier (to E. I. du Pont de Nemours & Co.).

Increasing the surface tackiness of an unvulcanized rubber by incorporating a salt formed by reacting a rosin acid upon an amine of the class of aliphatic amines in which any oxygen is connected to the carbon by only one bond and consisting of cetyl dimethylamine, dioctylamine and ethanolamines. No. 2,457,335. Ira Williams and Clinton A. Carlton (to J. M. Huber Corp.).

Treating rubber goods comprising coating prior to curing with an aqueous wax emulsion. No. 2,457,641. Fred H. Bunn (to S. C. Johnson & Son, Inc.).

Methyl siloxane gums and elastomers. No. 2,457,688. Robert H. Kriebel and John R. Elliott (to General Electric Co.).

Emulsion-polymerization of butadiene-1,3 hydrocarbons. No. 2,457,701. Charles D. McCleary (to U. S. Rubber Co.).

Canadian

Rubber compound. No. 453,250. Theodore A. TeGrotenhuis.

Plasticizing and softening rubber and synthetic rubber-like materials by admixing dibutyl amylthiosuccinate. No. 453,391. Russell T. Dean and Edwin O. Hook (to American Cyanamid Co.).

Plasticizing and softening rubber and synthetic rubber-like materials by admixing dibutyl ethoxyethoxysuccinate. No. 453,392. Russell T. Dean and Edwin O. Hook (to American Cyanamid Co.).

Plasticizing and softening rubber and synthetic rubber-like materials by admixing dibutyl thiodihydracrylate. No. 453,393. Russell T. Dean and Edwin O. Hook (to American Cyanamid Co.).

Copolymer of maleic anhydride and methyl ethyl ether. No. 453,476. Robert Thexton Armstrong (to Dominion Rubber Co.).

Reducing the rate of cure of a monolefine-diolefine copolymer rubber vulcanized with an oxidizing agent and a member of the quinone dioximino

class of vulcanizing agent by adding to the stock before cure a tetraalkyl thiuramdisulphide. No. 453,478. Robert Rhorer Sterrett (to Dominion Rubber Co., Ltd.).

Reducing the rate of cure of a copolymer of butadiene and styrene with a member of the chlorinated quinone class of vulcanizing agents by adding to the stock before cure a small amount of a thiuramdisulphide. No. 453,479. Robert Rhorer Sterrett (to Dominion Rubber Co., Ltd.).

Reducing the rate of cure of butyl rubber vulcanized with a member of the quinone dioximino class of rubber vulcanizing agents, by adding to the stock before a cure a small amount of an aryl polycarboxylic acid, or anhydride. No. 453,480. Robert Rhorer Sterrett and Frederic Lincoln Holbrook (to Dominion Rubber Co., Ltd.).

Reclaiming scrap containing vulcanized polychloroprene by heating in the presence of lecithin. No. 453,653. Walter Glenn Kirby and Leo Edward Steinle (to Dominion Rubber Co., Ltd.).

Composition comprising a rubbery copolymer of a major proportion of iso-octolefin and a minor proportion of conjugated diolefin with which is admixed 2,2'-dithio bis acetanilide. No. 453,654. Philip Timothy Paul (to Dominion Rubber Co., Ltd.).

Vulcanizing a rubber which comprising incorporating therein sulphur, a primary organic rubber-vulcanization accelerator, and di(p-chloro-o-nitrobenzene-sulphene) amide. No. 453,656. Ralph Arthur Coleman (to Dominion Rubber Co., Ltd.).

Vulcanized rubber product obtained by treating rubber with the condensation product of acetone and 3 amino dibenzo pyrrole. No. 453,695. Joseph Robinson Ingram (to Monsanto Chemical Co.).

*Specialties

Prevention of mist and frost on glass with a liquid composed of gelatin, nitro-cellulose, glacial acetic acid, sodium hydroxide, water, industrial methylated spirit. No. 2,454,886. Reuben Hillel Sapir.

Antioxidant for mineral oil lubricants which comprises condensing benzyl benzoate, N-dimethylaniline and formaldehyde in the presence of an activated clay catalyst. No. 2,454,890. Herschel G. Smith, Troy L. Cantrell and John G. Peters (to Gulf Oil Corp.).

Composition consisting of cellulose acetate and to reduce the destructive action of ultraviolet light, from 1-10% of the di-ester, of resorcinol, with a monohydroxy-monocarboxylic acid in which the hydroxyl group and the carboxyl group are directly attached to a nucleus selected from the group consisting of benzene nuclei and naphthalene nuclei. No. 2,454,950. William John Simpson and Donald Finlayson (to Celanese Corp. of America).

Hydraulic fluid consisting of potassium polymethacrylate dissolved in ethylene glycol, water and thioethylene diglycol. No. 2,455,117. Frank J. Glavis and Harry T. Neher (to Rohm & Haas Co.).

Drilling fluid comprising water and finely divided silica aerogel. No. 2,455,188. William F. Oxford, Jr. (to Sun Oil Co.).

Blanching seedlac and shellac by agitating in alcohol to which alcohol has been added sodium chlorite. No. 2,455,199. Lawrence R. Van Allen.

As an antioxidant, diisoeugenol. No. 2,455,256. Charles I. Jarowski (to Wyeth Inc.).

Lubricating composition comprising an oil of lubricating viscosity and the product produced by contacting with a solid adsorbent a petroleum oil substantially free of naphthenes and naphthenic acids, washing the adsorbent material with naphtha, dissolving from the adsorbent material the resinous material deposited thereon, which is soluble in chloroform, and esterifying such recovered resinous material with an organic hydroxy compound selected from the class consisting of alcohol and phenol. No. 2,455,337. William A. Jones (to Continental Oil Co.).

Seasoning refractory wood by soaking the wood in an aqueous solution containing urea and formaldehyde. No. 2,455,427. William Karl Loughborough (to U. S. A. by Sec. of Agriculture).

Producing a fire-resistant laminated article by impregnating fabric sheets with chlorinated paraffine, drying, then successively combining them. No. 2,455,454. Zachary T. Walter.

Stabilized solidified mineral oil consisting of a mineral oil gelled by a soap formed in situ from free saturated fatty acids, and stabilized by a fatty oil rich in esters selected from the group consisting of esters of saturated fatty acids and esters of hydroxylated unsaturated acids. No. 2,455,649. Alan Beerbower and Harold A. Ricards, Jr. (to Standard Oil Development Co.).

Soluble cutting oil consisting of mineral base lubricating oil, sodium petroleum sulfonate, sodium nitrite, naphthenic acid, caustic soda, isopropyl alcohol, wax, and a small amount of water. No. 2,455,659. Gordon W. Duncan and John C. Zimmer (to Standard Oil Development Co.).

Mineral oil composition normally susceptible to the formation of haze therein, comprising a viscous mineral oil fraction containing a minor proportion, sufficient to stabilize said oil fraction against the deleterious effects of oxidation, of a phosphorus- and sulfur-containing reaction product obtained by reaction of a phosphorus sulfide and a material selected from the group consisting of a bicyclic terpene and a cyclic terpene, and a minor proportion, sufficient to suppress the formation of haze therein, of a wax-substituted hydroxyaromatic ester of an organic carboxylic acid. No. 2,455,668. Everett W. Fuller and Henry S. Angel (to Socony-Vacuum Oil Co.).

Stable, oil-in-water emulsion by dispersing an oily substance in an aqueous liquid containing a glycol alginate. No. 2,455,820. Arnold B. Steiner (to Kelco Co.).

Grease composition comprising a mineral lubricating oil, an alkali soap of a high molecular weight fatty acid, and an alkali salt of acetic acid. No. 2,455,892. Harold M. Fraser (to International Lubricant Corp.).

Hydraulic fluid consisting of water and ethylene glycol having dissolved therein a soluble thickener of the class consisting of ethyl bromide addition product of polyvinyl pyridine, ethyl bromide addition product of styrene-vinyl pyridine co-polymer, polyvinyl alcohol, alkali metal polyacrylates, alkali metal polyalkacrylates and alkali metal salts of N-(carboxyalkoxymethyl)-polyamides, said soluble thickener having a molecular weight in excess of 1000. No. 2,455,961. Kenneth E. Walker (to E. I. du Pont de Nemours & Co.).

Flux coating for welding rods consisting of boric acid, borax, sodium silicate, alkali metal bichloromate and sodium alginate. No. 2,456,121. Walter Goerg (to Air Reduction Co., Inc.).

An improvement agent for mineral oil lubricants by heating an essentially paraffinic base lubricating oil with phosphorus pentasulfide in the presence of a surface active silica-containing solid catalyst. No. 2,456,336. Herschel G. Smith and Troy L. Cantrell (to Gulf Oil Corp.).

Hydrocarbon diesel fuel consisting of a diesel fuel normally subject to the formation of gums containing an oil soluble surface active agent selected from the alkyl monoamines and fatty acid amines. No. 2,456,569. Andrew I. Smith (to Union Oil Co. of Calif.).

* U. S. Patents from Vol. 616, No. 5. Vol. 617, Nos. 1, 2, 3, 4. Canadian from Nov. 30-Dec. 28.

Soluble oil composition. No. 2,456,587. Robert M. Koppenhoefer (to Socony-Vacuum Oil Co., Inc.).

Solid water-repellency composition containing water, paraffin wax, a polyvalent metal salt selected from the group consisting of aluminum formate, aluminum acetate, zirconium acetate, zirconium oxychloride and zirconium ammonium carbonate and a fixed dispersing agent comprising sorbitan monopalmitate and polyoxyalkylene sorbitan monopalmitate. No. 2,456,595. Clifford T. Rood (to S. C. Johnson & Son, Inc.).

Non-evaporating soldering flux consisting of a saturated solution of metallic zinc in hydrochloric acid containing citronella oil and a saturated solution of sal ammoniac. No. 2,456,624. Thomas Brooks.

Removing the resinous fraction from sugar cane wax comprising sugar cane wax from which the soft fraction has been removed with a lower alcohol having not more than 3 carbon atoms. No. 2,456,641. Elbert S. McLoud (to S. C. Johnson & Son, Inc.).

Grease composition with polymer thickeners, oxidation, rust and corrosion inhibitors and extreme pressure additives comprising metallic soap and a diester of a dicarboxylic acid and a silicone. No. 2,456,642. Robert L. Merker.

Separating crude cane wax into various fractions comprising contacting molten crude sugar cane wax with a fat solvent selected from the group consisting of acetone, methyl ethyl ketone, ethyl ether, pentane, hexane and heptane. No. 2,456,655. Oscar J. Swenson (to Colonial Sugars Co.).

Recovering a hard wax fraction from crude sugar cane wax comprising contacting molten crude sugar cane wax with a fat solvent selected from the group consisting of acetone, methyl ethyl ketone, ethyl ether, pentane, hexane and heptane. No. 2,456,656. Oscar J. Swenson (to Colonial Sugars Co.).

Treating crude cane wax comprising contacting crude cane wax with propyl alcohol. No. 2,456,661. Edward A. Wilder (to S. C. Johnson & Son, Inc.).

Producing a lubricating oil addition agent comprising the partial oxidation of a non-aromatic cyclic hydrocarbon. No. 2,456,692. Adalbert Farkas and Arthur F. Stribley, Jr. (to Union Oil Co. of Calif.).

Fungus-proofing and water-proofing composition for the treatment of cellulosic substances comprising (1) a water-in-oil emulsion, said emulsion having an oil phase comprising a halogenated 8-hydroxyquinoline derivative selected from the group consisting of 5,7-dibromo-8-hydroxyquinoline, 5,7-dichloro-8-hydroxyquinoline and the copper salts thereof, a modified alkyl resin made from a polyhydroxy alcohol and a modifying substance selected from the group consisting of fatty oil and fatty oil acids, said resin containing phthalic radical, said resin being soluble in mineral spirits, a chlorinated diphenyl mixture containing chlorine and mineral spirits and (2) a resinous hydrocarbon-soluble condensation product selected from the group consisting of dimethylol urea resins, dimethylol urea ether resins, tetramethylol melamine resins and tetramethylol melamine ether resins. No. 2,457,025. Paul George Benigius (to Monsanto Chemical Co.).

Mixing a colloidal clay with sodium silicate solution, mixing in a vegetable protein and bringing the water content to form a dry-mix adhesive which when added to water, forms a final adhesive. No. 2,457,108. Chester L. Baker and Robert H. Sams (to Philadelphia Quartz Co.).

In refrigeration employing an absorption refrigeration system utilizing ammonia in which solid chemical reaction products are apt to interfere, that improvement which consists of adding an alkali nitrite to inhibit corrosion. No. 2,457,334. Nils Erik Widell (to Aktiebolaget Elektrolux).

Adhesive comprising concentrated waste liquor of the sulfate pulp process and phosphoric acid. No. 2,457,357. James E. Fenn.

Grease composition comprising refined mineral oil, asphalt, and a mixture of alkali-metal and zinc fatty acid soaps. No. 2,457,582. Paul R. McCarthy (to Gulf Research & Development Corp.).

Grease composition consisting of mineral lubricating oil, calcium soaps of fatty acids, and a small quantity of a lead salt of an aliphatic monocarboxylic acid containing not more than 8 carbon atoms. No. 2,457,586. John F. McGrogan (to The Atlantic Refining Co.).

Breaking water-in-oil emulsions by mixing therewith a demulsifying agent from the group consisting of ammonium salts and alkali metal salts of sulfonated substantially pure pinene and limonene. No. 2,457,735. Michael Savoy (to Pure Oil Co.).

Canadian

Gelatinized starch composition of strong adhesive properties containing a starch as substantially the sole bonding agent and a water soluble urea. No. 453,199. Hans F. Bauer (to Stein, Hall Mfg. Co.).

Water-soluble adhesive composition containing a major proportion of a dextrinized starch conversion product, a minor proportion of urea, and a water-soluble, normally solid, weakly alkaline, slightly hygroscopic, normally crystalline material. No. 453,200. Hans F. Bauer (to Stein, Hall Mfg. Co.).

Electrically insulating oil stabilized with diphenyl piperazine. No. 453,260. Sin-iti Irigai (Canadian General Electric Co., Ltd.).

A hydrocarbon oil and an alkaline earth metal salt of a substituted oxy acid of phosphorus. No. 453,407. Bruce Barton Farrington and James Oliver Clayton (to Standard Oil Co. of Calif.).

A hydrocarbon oil and a heavy metal salt of a substituted oxy acid of phosphorus. No. 453,408. Bruce Barton Farrington, James Oliver Clayton and John Tipton Rutherford (to Standard Oil Co. of Calif.).

Preserving drying oil compositions which tend to deteriorate by the absorption of oxygen from the air by adding an organic compound containing the bivalent oximido group. No. 453,619. Michael A. Eitelman (to Allied Chemical & Dye Corp.).

Printing ink consisting of coloring material, a solvent consisting of 2-ethyl hexanediol-1,3 and a resinous binder. No. 453,687. Caesar Frank Chiappe and John William Kroeger (to Fred'k H. Levey Co., Inc.).

Incorporating a metal base in a lubricating oil containing an amount of an organic acid, said metal base and organic acid being capable of forming an oil-soluble salt, comprising mixing said oil with said metal base and a small amount of strong aqueous ammonia. No. 453,716. Roland F. Bergstrom (to Shell Development Co.).

Improving the wetting properties of a substantially asphalt-free mineral lubricating oil comprising treating with a sulpho compound having the formula, $RO-SO_2-X$, in which R is a primary alkyl group having up to 8 carbon atoms and X is an organic radical of the class consisting of hydroxyl, primary alkoxy and aryl radicals. No. 453,717. Johan Marius Hoeffelman (to Shell Development Co.).

*Textiles

Textile treating agent which comprises a hydrocarbon textile lubricating oil and an alkali metal petroleum mahogany sulfonate. No. 2,454,822. Abraham Moscowitz (to L. Sonneborn Sons, Inc.).

Regeneration of activated carbon contaminated with sulphur and sulphuric acid resulting from manufacture of viscose rayon which consists of washing with a warm aqueous bicarbonate solution, rinsing in an aqueous sodium sulphite solution to transform the sulphur into

sodium thiosulphate, washing with hot and cold water, and steaming, drying and cooling. No. 2,455,260. Gerhard Jan Meerding (to American Enka Corp.).

Producing a durable water-repellency in a fibrous textile material by impregnating with an aqueous dispersion of cetyl acetamide, zirconium stearate and zirconium formate. No. 2,455,886. Peter J. Arient and Herman C. Allen (to Sayles Finishing Plants, Inc.).

Aqueous urea formaldehyde resin for stabilizing textiles. No. 2,456,191. Philip Stanley Hewett (to Reichold Chemicals Inc.).

Textile wax consisting of hydrocarbon wax and a polyethylene glycol monostearate. No. 2,456,283. George D. Jefferson (to Atlas Powder Co.).

Preparing stable resins for treating textile fibers which comprises reacting a monomeric, monohydric alcohol ether of a methylol melamine with thiourea and formaldehyde. No. 2,456,568. Milton J. Scott and Stuart H. Rider (to Monsanto Chemical Co.).

Imparting shrinkage resistance to wool and to fabrics comprising wool, comprising: treating with a hypochlorite solution and a buffer system comprising borax. No. 2,457,053. Harry F. Clapham, Milton Harris and Arthur L. Smith (to Harris Research Labs.).

Canadian

Treating fabrics and other textile materials consisting at least in part of wool, to reduce the tendency to shrink, comprising treating with a dilute aqueous solution of an alkali metal permanganate and with a dilute aqueous solution containing a substance selected from the group consisting of alkali hypophalite and a nitrogen-chloro compound in which the chlorine atom is directly attached to the nitrogen atom. No. 453,043. John Leonard Raynes and Francis Malcolm Stevenson (to Stevensons (Dyers) Ltd.).

Agricultural

An insecticide comprising an insect-paralyzing agent intermixed with phthalylmethyl alkyl ketone serving to impart lethal qualities to the insecticide. No. 23,080. Howard W. Eck, deceased, and Jared H. Ford.

Insecticidal composition of pyrethrins and 3,4-oxyethylene-phenyl-1-butylglycol synergist. No. 2,457,957. Herman Wachs (to U.S. Industrial Chems., Inc.).

Insecticidal solution containing 1-phenylethylidenemalonitrile. No. 2,458,017. D. T. Mowry (to Monsanto Chemical Co.).

Nicotine and beta-beta-dichlorethyl ether insecticide. No. 2,459,138. Owen T. Coffin and David J. Raden (to Swift & Co.).

Triphenylmethyl butyl ether as an insecticide. No. 2,459,525. Ingenuin Hechenbleikner (to American Cyanamid Co.).

1-naphthylmethyl tetradecyl ether as an insecticide. No. 2,459,526. Ingenuin Hechenbleikner (to American Cyanamid Co.).

Suppressing parasitic fungus growths on living plants by bringing into contact with a kojic acid salt of a divalent heavy metal. No. 2,460,188. Walter C. O'Kane and Glen H. Morey (to Commercial Solvents Corp.).

Method of controlling organisms which cause decay of citrus fruits by applying a toxic quantity of a water soluble compound selected from the group consisting of 2-aminopyridine and its salts of acids. No. 2,460,710. Kenneth G. Nolan, Russell L. Morgan and John H. Fletcher (to American Cyanamid Co.).

Cellulose

Introducing amino groups into cellulose comprising treating the cellulose with an aqueous solution of sodium hydroxide and 2-aminoethylsulfuric acid, heating and then washing the cellulose to remove sodium hydroxide. No. 2,459,222. John D. Guthrie (to U.S.A. by Sec. of Agriculture).

Cellulose oxazolidone ethers. No. 2,459,547. Frank K. Signaigo (to E. I. du Pont de Nemours & Co.).

Production of regenerated cellulose sheet material which comprises subjecting a solvent-cast, substantially dry, non-fibrous sheet material having a basis of cellulose acetate to the action of an aqueous solution of acetone to effect a swelling of said sheet material, subjecting the swollen cellulose acetate sheet material to the saponifying action of an aqueous solution containing sodium acetate, sodium sulfate and sodium hydroxide whereby there is obtained a regenerated cellulose sheet. No. 2,459,927. Camille Dreyfus, Bjorn Andersen and Nickolas N. Kojevnikov (to Celanese Corp. of America).

Plasticized lower fatty acid ester of cellulose. Amerigo F. Caprio and William Horbach (to Celanese Corp. of America).

In manufacturing artificial filaments of regenerated cellulose from viscose comprising spinning into an aqueous coagulating medium and subjecting to aqueous after-treatment, the step of treating with a solution comprising a volatile hydrophobic hydrocarbon solvent and an organic compound capable of withdrawing water from the filamentary material and blending the withdrawn water with the hydrocarbon solvent into a substantially single phase system. No. 2,460,400. Carl Schlatter and Carl V. Holmberg (to American Viscose Corp.).

Waterproofing cellulosic material with higher aliphatic acyl peroxides. No. 2,460,777. Warren B. Warden (to Peter J. Gaylor).

Canadian

Bleaching cellulosic materials in solutions or suspensions with an alkaline reaction by adding chlorine dioxide. No. 454,238. Karl Nicolaus Cederquist (to Stora Kopparbergs Bergslags Aktiebolag).

Ceramics

Composition comprising a mixture (a) a water-soluble alkali-metal phosphate glass having a single alkali-metal oxide constituent, (b) an alkali-metal alkaline reacting crystalline compound the alkali-metal of which is other than the alkali-metal of (a). No. 2,458,292. C. J. Nummer (to Hall Labs., Inc.).

Magnesia refractory matter having volatilizing bonding means for the magnesia clinker embodying an agent which includes an element of the right-hand column of periodic groups V and VI having atomic weight not less than sulphur nor greater than tellurium, and a small per cent each of a plasticizing agent and soluble silicate binder. No. 2,458,533. Robert A. Schoenlaub (to Basic Refractories, Inc.).

Protecting furnace combustion-zone surfaces against the deteriorating effects of slag depositions, consisting in projecting a stream of refrac-

* U. S. Patents from Vol. 616, No. 5. Vol. 617, Nos. 1, 2, 3, 4. Canadian from Nov. 30-Dec. 28.

tory chrome ore-calcium aluminate-ball clay mix on said surfaces. No. 2,460,347. William E. Heller.

Canadian

Ceramic composition comprising a practically pure calcined alumina, a flux comprising a trisilicate alkaline earth phosphate, and a plasticizer comprising a hydrated silicate of alumina. No. 454,012. L. Bonnet (to General Motors Corp.).

Coatings

Non-blocking melt-coating composition of a heat stable butyric acid ester of cellulose, a cuprammonium with not more than 2 hydroxyl groups per 24 cellulose carbon atoms, sufficient di-2-ethyl hexyl phthalate to impart good fluidity, a wax and unhydrolyzed polyvinyl acetate. No. 2,458,428. M. Salo (to Eastman Kodak Co.).

Fusible and readily removable protective coating for metal articles comprising ethyl cellulose and mineral oil. No. 2,458,486. A. E. Young (to Dow Chemical Co.).

Preparation of a lacquer raw material wherein an ethylene oxide derivative of a phenol is heated in the presence of a suitable solvent with dicyandiamide and an ether of a formaldehyde condensation product of a substance of the group consisting of melamine, urea, dicyandiamide and phenol. No. 2,458,796. Gustav H. Ott and Wilhelm Kraus (to Ciba, Ltd.).

Ferrous metal coating method comprising wetting the ferrous metal with a water solution of ammonium chloride drying and heating in an atmosphere containing sufficient hydrogen to make it reducing and subsequently coating the ferrous metal with molten metal selected from the group consisting of zinc, tin, aluminum and their alloys. No. 2,459,161. Arch W. Harris and Alfred H. Ward (to American Steel & Wire Co. of N.J.).

Webbable, strippable coating composition comprising vinyl chloride-vinyl acetate copolymer and vinylidene chloride-acrylonitrile copolymer, the balance of the non-volatile components including plasticizer, said components being dissolved in a volatile solvent to give a solution of sprayable viscosity. No. 2,459,164. William Henry Holst and George Russell Hersam.

Producing a laminated article comprising coating a flat or contoured platen with a polyester base resin in liquid form, exposing the resin to ultra-violet light to harden, bringing a base into contact with the exposed resin surface, heating the resin while maintaining it under pressure between the base and the platen, and subsequently stripping the platen from the resin and base. No. 2,459,279. Robert W. Holden (to Laminating Specialties, Inc.).

Prolonging the useful life of aqueous aluminum-casein coating composition. No. 2,459,408. John Alfred Bicknell (to S. D. Warren Co.).

Lacquer to protect electrical components comprising shellac, xylene-formaldehyde resin, a glyceride of pimaric ricinoleic acid and a lacquer solvent. No. 2,460,103. Charles Rossall Pye (to Hartford National Bank & Trust Co.).

Coating composition comprising an amide-aldehyde resin and a polyester of 2-ethyl hexanedioic-1,3 and a dicarboxylic acid as a plasticizer. No. 2,460,186. Eugene W. Moffett (to Pittsburgh Plate Glass Co.).

Coating composition comprising an amide-aldehyde resin and a polyester of an alpha-alkyl ether of glycerol and a dicarboxylic acid as plasticizer. No. 2,460,187. Eugene W. Moffett (to Pittsburgh Plate Glass Co.).

Manufacturing flexible, wrinkle-coated materials comprising mixing unsaturated fatty oil with varnish solvent and polyvinyl chloride, applying to a base material, and subjecting to drying. No. 2,460,485. Nathan T. Beynon (to New Wrinkle, Inc.).

Canadian

Mixing an organo-siloxane and a heat-resistant filler, incorporating into said mixture a minor proportion of a diacyl peroxide, applying the mixture to a base member to form a coating. No. 453,997. E. L. Warlick (to Corning Glass Wks.).

Producing a homogeneous coating of a synthetic resin by spraying the resin on to the surface to be coated in a finely divided state by means of a spraying apparatus in which a gas under pressure is used to direct the material in a stream through or adjacent to a flame of a temperature sufficient to melt the resin or at least render it plastic and adherent to the surface in the form of a coherent film. No. 454,220. Charles Fletcher Lumb (to Schori Metallizing Process, Ltd.).

Detergents and Surface Active Media

Solid, all-soap product for washing with water, consisting essentially of an unfilled alkali metal soap and 1 to 15% by weight of guanidine stearate. No. 2,459,818. Lloyd F. Henderson (to Lever Bros. Co.).

Producing hydrocarbon oil concentrates of metal sulfonates. No. 2,459,995. Gordon W. Duncan and John C. Zimmer (to Standard Oil Development Co.).

Dyes & Pigments

Preparing pigments by reacting raw starch with calcium chloride and thereafter reacting with an aqueous solution of a salt of the class consisting of sodium carbonate and sodium tetraborate. No. 2,457,797. W. L. Craig (to R. T. Vanderbilt Co., Inc.).

Pyrazolone azo dyes. No. 2,457,823. J. D. Kendall and D. J. Fry (to Ilford, Ltd.).

Phosphorescent pigment comprising the product of heat treating a mixture of an alkaline earth metal sulphide of the group consisting of calcium sulphide and strontium sulphide and minute amounts of a bismuth salt and a lead salt. No. 2,458,286. Neville F. Miller (to New Jersey Zinc Co.).

Process for dyeing nylon fibres at an enhanced rate of absorption with direct cotton dyestuffs by incorporating a water-insoluble condensation product of formaldehyde and a member of the group consisting of cyanamide, dicyandiamide, melamine, guanidine, biguanide, dicyandiamidine, alkyl, hydroxyalkyl and aryl substituents of guanidine, biguanide and dicyandiamide. No. 2,458,397. J. H. MacGregor (to Courtauld, Ltd.).

Anthraquinone dye compounds. No. 2,459,149. Harry W. Coover, Joseph B. Dickey and Edmund B. Towne (to Eastman Kodak Co.).

Acid treatment of pyranthrone vat dyestuffs. No. 2,459,366. John F. Cullinan and Lawrence D. Lytle (to American Cyanamid Co.).

Anthrime carbazole dyestuffs. No. 2,459,424. Hermann Hauser and Max Bommer (to Ciba, Ltd.).

Substantive triazine azo dyes. No. 2,459,435. Ernst Keller and Reinhard Zweidler (to J. R. Geigy A. G.).

Polyazo benzidine dyes. No. 2,459,467. Fritz Straub and Jakob Brassel (to Ciba, Ltd.).

Producing colored images on a relatively stable background on only one side of a travelling fibrous carrier by the electrolytic facsimile recording method by impregnating the carrier with an aqueous alkaline azo dye forming composition comprising as a diazoamine compound stable to light and air oxidation in an alkaline medium and splitting under the influence of the electrolytic recording current to yield diazonium ions. No. 2,459,521. Harold G. Greig (to Radio Corp. of America).

Copper phthalocyanine containing attached to the phenylene nuclei between 3 and 4 sulfonamidopyridine groups. No. 2,459,771. Arthur L. Fox (to General Aniline & Film Corp.).

Copper phthalocyanine of the benzene series having attached to the phenylene nuclei up to 4 polyhydroxy sulfonamide groups. No. 2,459,773. Raymond Lemuel Mayhew (to General Aniline & Film Corp.).

Monazo chromium complex. No. 2,459,813. Harry W. Grimmel and Ludwig Richter (to General Aniline & Film Corp.).

Process for dyeing nylon with acid dyes of limited solubility. No. 2,459,831. Frank C. McGrew and William Henry Sharkey (to E. I. du Pont de Nemours & Co.).

Polyazo dyestuff capable of being metallized. No. 2,459,913. Werner Bossard (to J. R. Geigy A. G.).

Anthraquinone vat dyestuffs. No. 2,459,941. Theodor Holbro, Walter Kern and Paul Sutter (to Ciba, Ltd.).

Basic lead sulfate pigment. No. 2,460,241. Adrian Richard Pitrot (to National Lead Co.).

Triazine azo dyes. No. 2,460,618. Eduard Bernasconi (to Ciba, Ltd.).

Synthesis of phthalocyanines from ω -chlorine or ω -bromine substituted o-tolunitriles. No. 2,460,779. Robert E. Brouillard and Erwin Baumgarten (to American Cyanamid Co.).

Preparation of phthalocyanine pigments from ω -chlorine or ω -bromine substituted o-xylenes. No. 2,460,783. Hans Z. Lecher, Robert E. Brouillard and Erwin Baumgarten (to American Cyanamid Co.).

Modifying a pigment comprising calcium carbonate by directing paste comprising said pigment into the path of travel of percussive members of a rotor element and subjecting it to the action of said percussive members a sufficient number of times to effect a reduction in the adhesive requirement of said pigment. No. 453,900. Harold R. Rafton (to Raffold International Corp.).

Explosives

Delay element composition comprising powdered zirconium metal, powdered nickel metal, an oxidizing agent selected from the group consisting of chlorates, perchlorates and nitrates, and an oxidizing agent selected from the group consisting of water-insoluble chromates, manganese dioxide, lead monoxide, and red lead. No. 2,457,860. O. G. Bennett and J. Dubin (to Catalytic Research Corp.).

Production of a detonating explosive suitable for commercial blasting purposes by emulsifying a molten high explosive with the assistance of an emulsifying agent in a melt which comprises ammonium nitrate and at least one compound non-volatile at the temperature of the melt and adapted to lower the melting point of the ammonium nitrate. No. 2,460,375. John Whetstone (to Imperial Chemical Industries, Ltd.).

Inorganic

Producing tin fluoborate by mixing fluoboric acid and cupric oxide, heating to form copper fluoborate, adding metallic tin to produce tin fluoborate and precipitating metallic copper. No. 2,457,798. A. L. Ferguson (to Federal-Mogul Corp.).

Purification of titanium halides by treatment with metal hydrides and distillation. No. 2,457,917. D. G. Nicholson.

Preparing strong microspherical silica catalysts by removing the alkali metal from an alkali metal silicate solution with an ion exchange resin. No. 2,457,970. J. C. Bailie (to Standard Oil Co.).

Silica sol from an alkali metal silicate solution by contacting with an ammonium ion exchanger. No. 2,457,971. V. Voorhees (to Standard Oil Co.).

Recovering hydrogen fluoride from an azeotropic mixture of the same with water by cooling to form crystals, recovering and melting and recovering hydrogen fluoride as overhead product in a fractional distillation. No. 2,458,044. C. Alexander (to Phillips Petroleum Co.).

Preparing sodium salts of hydroxylamine sulfonic acids by contacting sodium nitrite and sodium acid sulfate with gaseous sulfur dioxide. No. 2,458,404. W. M. Nagle (E. I. du Pont de Nemours & Co.).

Stabilizing material of the group consisting of sulfur trioxide and oleum of SO₃ strength not less than 99.5% by incorporating a compound of the class consisting of the oxides and halides of boron and the inorganic derivatives thereof. No. 2,458,718. Harold G. McCann (to Allied Chemical & Dye Corp.).

Electrodeposition of indium and its alloys from an electroplating bath containing the anion SO₃NH₂ and the cation In in an ionizing solvent. No. 2,458,839. John Robert Dyer, Jr., and Timothy J. Rowan (to Indium Corp. of America).

Process for manufacture of magnesium products by reacting the impure brine with a lime containing material to convert the magnesium salts to a magnesium hydroxide precipitate. No. 2,458,847. Gunter H. Gloss (to Marine Magnesium Products Corp.).

Primary cell comprising an amalgamated zinc anode, a coherent conductive cathode comprising an electrolytically reducible oxygen-yielding compound and an electrolyte between and in contact with said anode and cathode predominantly comprising an aqueous solution of an alkali metal carbonate. No. 2,458,378. Samuel Ruben.

Recovering ammonia by distillation from nickeliferous ore tailings pulp containing residual ammoniacal leach solution and unstable magnesium compounds as impurities. No. 2,458,902. Robert R. Fitzhugh, Benjamin F. Frederick and Bernard A. Axelrad (to Nicaro Nickel Co.).

Producing chlorine dioxide comprising reacting nitrogen trichloride with sodium chlorite. No. 2,459,124. George M. Booth (to Novadel-Agene Corp.).

An aqueous solution of a basic aluminum salt in which the acid radical of the salt is in quantity of from over 3 to less than 6 equivalents, and magnesium sulphate in the proportion of over one-third molecule of magnesium sulphate for each 2 atoms of aluminum. No. 2,459,289. Victor H. Roehrich.

Manufacture of soda ash by maintaining a fluidized mass of previously manufactured soda ash in a rising carbon dioxide gas stream within a confined reaction zone, introducing sodium bicarbonate into said reaction zone, decomposing said bicarbonate while in said zone into soda ash, carbon dioxide and water vapor, withdrawing soda ash

solids from said reaction zone, separating. No. 2,459,414. Egbert Wendell Carrier (to Standard Oil Development Co.).

Continuously producing aqueous HF of uniform HF content comprising producing a mixture of gaseous anhydrous HF containing SO₂ as an impurity with a gas inert thereto, passing the resulting gaseous mixture into a packed, vented column, passing water downwardly through said packed column whereby it absorbs HF from said gaseous mixture but the SO₂ is flushed out by the inert gas. No. 2,459,438. Harry C. Kremers and Irwin E. Johnson (to Harshaw Chemical Co.).

Preparing oxides of manganese comprising preparing a solution of manganese sulfate with an ammonium hydroxide, subjecting the solution to oxygen and maintaining an ammonium sulfate concentration less than 45 grams per liter. No. 2,459,714. Ralph W. Moulton (to Manganese Products, Inc.).

Purifying raw native sulphur which consists in mixing with said sulphur an acid-neutralizing material chosen from the group consisting of oxygenous compounds of calcium and barium. No. 2,459,764. Frank M. Yeiser (to Niagara Research Corp.).

Drying inorganic oxide gels in the form of small discrete spheroidal particles. No. 2,459,903. Vanderveer Voorhees (to Standard Oil Co.).

Mixed silica-alumina, silica-magnesia catalyst. No. 2,459,987. Julius P. Bilisoly (to Standard Oil Development Co.).

Cobalt sulfate relative humidity indicators. No. 2,460,065. Paul Bell Davis (to Davison Chemical Corp.).

Cobalt sulfate relative humidity indicators. No. 2,460,066. Paul Bell Davis (to Davison Chemical Corp.).

Copper bromide relative humidity indicators. No. 2,460,067. Paul Bell Davis (to Davison Chemical Corp.).

Cobalt bromide relative humidity indicators. No. 2,460,068. Paul Bell Davis (to Davison Chemical Corp.).

Cobalt bromide relative humidity indicators. No. 2,460,069. Paul Bell Davis (to Davison Chemical Corp.).

Cobalt phosphate relative humidity indicators. No. 2,460,070. Paul Bell Davis (to Davison Chemical Corp.).

Cobalt chloride relative humidity indicators. No. 2,460,071. Paul Bell Davis (to Davison Chemical Corp.).

Copper chloride relative humidity indicators. No. 2,460,072. Paul Bell Davis (to Davison Chemical Corp.).

Cobalt iodide relative humidity indicators. No. 2,460,073. Paul Bell Davis (to Davison Chemical Corp.).

Cobalt thiocyanate relative humidity indicators. No. 2,460,074. Paul Bell Davis (to Davison Chemical Corp.).

Preparation of a dehydrogenation catalyst comprising adding to an aqueous solution containing an aluminum salt and a compound selected from the group consisting of ammonium dichromate, ammonium chromate, chromium trioxide, a precipitant selected from the group consisting of ammonia, ammonium bicarbonate, ammonium carbonate in an amount to give complete precipitation of the aluminum. No. 2,460,333. John George Mackay Bremner, Peter William Reynolds and Arthur William Charles Taylor (to Imperial Chemical Industries, Ltd.).

Making water soluble aluminium phosphates up to di-aluminium phosphate by reacting aluminium hydrate with phosphoric acid. No. 2,460,344. Herbert H. Greger.

Reducing the rate of reversion of that form of sulphur which is insoluble in carbon disulphide to that which is soluble in carbon disulphide by incorporating a halogen. No. 2,460,365. Alvin Schallis (to Stauffer Chemical Co.).

Canadian

In producing iron carbonyl the improvement which comprises reducing iron ore in the presence of heavy metal sulphate and reacting said reduced iron ore with carbon monoxide at pressures not greater than about 200 atmospheres. No. 453,853. Albert Edward Wallis and Stanley Charles Townsend (to The International Nickel Company of Canada).

Manufacture of zinc peroxide by adding a zinc compound selected from the group consisting of zinc oxide and zinc hydroxide to a solution of hydrogen peroxide containing a substance selected from the group consisting of water soluble zinc salts and acids which form water soluble zinc salts to give a precipitate of zinc peroxide. No. 454,020. W. S. Wood and G. Clennett (to B. Laporte, Ltd.).

Luminescent material having an improved maintenance stability of fluorescent brightness, consisting of a complex of silica with zinc, beryllium, and manganese oxides co-fired and thereby intimately combined. No. 454,380. Herman C. Froelich (to Canadian General Electric Co., Ltd.).

Leather

Preparing an artificial leather by coating a sateen fabric with a composition having copolymer of butadiene and acrylonitrile, terpene resin (advagum), camel whitening (calcium carbonate), stearic acid, zinc oxide, non-heat hardening phenolic resin, cumarone resin, benzothiazyl disulfide, and sulfur, allowing the solvent to evaporate, and then applying polymerized chloroprene, copolymer of butadiene and acrylonitrile, chlorinated polyethylene (65% chlorine), release agent, zinc oxide, magnesium oxide, calcium carbonate, ground leather, light process petroleum oil, colored pigments, benzothiazyl disulfide, sulfur and phenyl salicylate. No. 2,459,874. Robert E. Fay, Jr. (to E. I. du Pont de Nemours & Co.).

Metals

Electrolytic polishing of stainless steel in a bath of concentrated nitric acid and concentrated acetic acid. No. 23,068. A. L. Feild (to Armo Steel Corp.).

Electrolytic polishing of stainless steel in a bath of concentrated aqueous nitric acid and water. No. 23,069. A. L. Feild (to Armo Steel Corp.).

Producing base-metal consisting of chromium and manganese and containing less than 1% of iron by reduction of ore containing oxide of said base-metal and oxide of iron, by subjecting it to the reducing action of a ferro-alloy which is rich in said base-metal, subjecting the molten slag to the reducing action of a portion of the base-metal. No. 2,458,469. A. Greffe (to Societe D'Electro-Chimie, D'Electro-Metallurgie et Des Acieries Electriques D'Ugine).

Structural element for high temperature service use and capable of resisting the corrosive action of lead oxide, comprising an alloy containing chromium, nickel, tungsten and carbon, the balance being iron. No. 2,458,502. Arthur T. Cape (to Coast Metals, Inc.).

Stripping electrodeposited manganese in large pieces from a stainless steel cathode plate by heating the plate with the deposited metal to a temperature about 350° C. for a period of 15 minutes to 2 hours; and then breaking the deposited metal from the cathode plate. No. 2,458,908. James H. Jacobs (to Crimora Research and Development Corp.).

In the process of electroplating tin from an aqueous alkaline stannate

bath the step of improving the anode efficiency by employing an anode consisting of an alloy with a metal of the class consisting of aluminum, gallium and manganese. No. 2,458,912. Frederick A. Lowenheim (to Metal & Thermit Corp.).

Electrolytic protective surface treatment of magnesium base alloy by treating in an electrolyte consisting of a solution in water of dichromate ion, sulfate ion, a buffer mixture consisting of acetic acid and sodium acetate. No. 2,459,365. Geoffrey Edward Coates (to Permanent Metals Corp.).

Treating tungsten ore to recover tungsten as calcium tungstate. No. 2,459,868. Elsie Burwell and Joseph H. Brennan (to U. S. Vanadium).

Extracting beryllium oxide from beryl by mixing powdered beryl and having alumina with potassium carbonate and sodium carbonate; fusing, cooling and powdering the resultant slag; treating the powdered slag with sulphuric acid to decompose the silicates into silica and facilitate the formation of potassium alum from the alumina, heating the slurry to change the silica into insoluble silica; extracting; filtering out the silica; heating the solution to concentrate; cooling to form crystalline potassium alum; removing the alum; and processing the resultant liquid for the recovery of beryllium oxide. No. 2,459,895. Anton Schormuller (to Clifton Products, Inc.).

Producing on a surface a deposit of highly dispersed colloidal silver by reducing, in contact with the surface on which the deposit is to be produced an aqueous solution of a silver compound providing silver ions, by reacting a heterocyclic secondary amine to effect such reduction, said heterocyclic secondary amine being selected from the group consisting of piperidine, morpholine, thiomorpholine, pyrrolidine, these alkyl and alkyl substitution products, and mixtures thereof. No. 2,459,897. George Schwarz.

Separating the components of ores of the class consisting of non-sulfide non-silicate minerals admixed with silicious gangue and silicate minerals admixed with quartz and soluble potash minerals by admixing an aqueous pulp of the ore in a suitably divided state with a collector selected from the group consisting of the amides and imides of trivalent iron, chromium and aluminum and salts of their amides and imides which contain at least one functioning hydrocarbon group from the class of aliphatic groups containing 7 or more carbon atoms at least 5 of which are in a single straight chain, hydrocarbon groups present in abietic and naphthenic acids, and amthalene and substituted benzene groups. No. 2,459,966. Karl F. Schilling (to Minerals Separation North American Corp.).

Separating components of ores of the class consisting of non-sulfide non-silicate minerals admixed with silicious gangue and silicate minerals admixed with quartz and soluble potash minerals by admixing with a collector selected from the group consisting of sulfuric acid and sulfuric acid amides, imides, and their salts and halides, which contain at least one functioning hydrocarbon group from the class of aliphatic groups containing 7 or more carbon atoms at least 5 of which are in a single straight chain, hydrocarbon groups present in abietic and naphthenic acids, and naphthalene and substituted benzene groups. No. 2,459,967. Karl F. Schilling (to Minerals Separation North American Corp.).

Canadian

Palladium alloy containing palladium and molybdenum. No. 454,019. J. C. Chaston (to Johnson, Matthey & Co., Ltd.).

Beneficiation of magnetite concentrates by flotation which comprises subjecting ore to magnetic separation, demagnetizing the residual mixture, subjecting the residual mixture to froth flotation using a cationic collector. No. 454,160. Fred D. DeVaney (to Erie Mining Co.).

Beneficiating a ferruginous chert by adding to an aqueous pulp of the chert an agent of the group consisting of alkali-acting alkali metal compounds, ammonium hydroxide and ammonium carbonate, and subjecting the alkaline pulp to cationic froth flotation treatment, using a frother and as cationic collector a water-soluble form of an aliphatic amine whose aliphatic radical corresponds in length to that of a fatty acid of coconut oil. No. 454,161. Fred D. DeVaney (to Erie Mining Co.).

In the process of beneficiating silicious iron ore by cationically froth-flooding the silicious gangue particles from the iron mineral particles by the use of a higher molecular weight aliphatic amine collector and a frother, the step of accelerating the rate of flotation of the silicious gangue particles which consists in incorporating a relatively very small amount of sodium sulphide into the pulp prior to the froth flotation. No. 454,162. Fred D. DeVaney (to Erie Mining Co.).

Producing carbon-containing electrolytic nickel by entrapping particles of elemental carbon on the surface of electrolytic nickel during the electro-deposition thereof from a nickel plating electrolyte and subjecting said electrolytic nickel and entrapped carbon to diffusion temperatures in a protective atmosphere. No. 454,186. Mortimer Pierce Buck (to International Nickel Co. of Canada, Ltd.).

Producing electrolytic nickel having incorporated therein addition agents which comprise mixing powdered nickel and at least one addition agent in powdered form to form a mixture, moulding said mixture to obtain a starting sheet, electro-depositing nickel on said starting sheet and subjecting said starting sheet and said electro-deposited nickel to temperatures at which diffusion of said addition agent occurs. No. 454,187. Mortimer Pierce Buck (to International Nickel Co. of Canada, Ltd.).

Producing modified electro-deposited nickel having incorporated therein addition agents modifying the physical characteristics thereof which comprises subjecting cathode nickel to the vapors of at least one volatile compound of at least one addition agent at temperatures at which diffusion occurs. No. 454,188. Mortimer Pierce Buck (to International Nickel Co. of Canada, Ltd.).

Separating the components of an ore of the class consisting of non-sulfide, non-silicate minerals mixed with silicious gangue and silicate minerals admixed with quartz by subjecting an aqueous pulp of the ore in a suitably divided state to a concentrating operation in the presence of the reaction product resulting from heating a mixture in which the principal ingredient is unsaturated fatty acid material containing hydrocarbon chains of 7 or more carbon atoms and the minor ingredient is nitric acid. No. 454,201. James B. Duke (to Minerals Separation North American Corp.).

Producing simultaneously pig iron of low titanium content and a high titania slag low in iron from a titaniferous iron ore. No. 454,410. Percy H. Royster (to Pickands Mather & Co.).

Organic

Aliphatic esters of 2,4,5-trichlorophenol. No. 2,457,805. A. R. Cade and W. S. Gump (Burton T. Bush, Inc.).

Acylating thiophene with an acylating agent selected from the group consisting of acyl halides and anhydrides of carboxylic acids in the presence of an iodine catalyst. No. 2,457,825. A. I. Kosak and H. D. Hartough (to Socony-Vacuum Oil Co., Inc.).

Condensation of alcohols. No. 2,457,866. C. A. Carter (to Carbide and Carbon Chems. Corp.).

- Converting ethylene to ethyl alcohol by subjecting ethylene to the action of an aqueous solution consisting of HF and BF₃ dissolved in water. No. 2,457,882. F. E. Frey (to Phillips Petroleum Co.).
- C black agglomeration. No. 2,457,962. T. H. Whaley (to Phillips Petroleum Co.).
- Pelleting carbon black. No. 2,457,963. G. Thodos (to Phillips Petroleum Co.).
- Preparing p-acetyl-phenyl acetate by contacting p-ethyl-phenyl acetate with oxygen in the presence of a catalyst consisting of chromium oxide and cobalt hydrate. No. 2,457,988. W. S. Emerson (to Monsanto Chem. Co.).
- Preparation of thioesters from hydrocarbon nitriles and mercaptans. No. 2,458,075. C. M. Himel (to Phillips Petroleum Co.).
- Production of diolefins from butenes and 5 carbon atom hydrocarbons more saturated than diolefins by contacting with a dehydrogenation catalyst in the presence of steam. No. 2,458,082. M. O. Kilpatrick (to Phillips Petroleum Co.).
- Preparation of carbon by oxidizing a non-aromatic compound selected from the group consisting of non-aromatic hydrocarbons and alcohols in the presence of liquid hydrogen fluoride. No. 2,458,107. J. H. Simons (to Phillips Petroleum Co.).
- Continuous fat splitting. No. 2,458,170. M. H. Ittner (to Colgate-Palmolive-Peet Co.).
- Preparing acetyl peroxide by blending acetic anhydride and hydrogen peroxide with a liquid ester of phthalic acid and thereafter adding alkali. No. 2,458,207. H. A. Rudolph and R. L. McEwen (to Buffalo Electro-Chemical Co., Inc.).
- Continuous production and recovery of xylenes by the liquid phase catalytic hydrogenation of nitro xylenes with a finely divided nickel catalyst. No. 2,458,214. M. Souders, Jr. (to Shell Development Co.).
- Making ethylene oxide by the direct chemical combination of ethylene and oxygen on a silver catalyst supported upon a carrier consisting essentially of a mixture of crystalline silica and alpha-alumina. No. 2,458,266. R. L. Heider and C. J. Stehman (to Monsanto Chemical Co.).
- Preparing vanillic acid from vanillin by adding a solution of a soluble silver salt to a solution of vanillin and an excess of alkali. No. 2,458,295. I. A. Pearl (to Sulphite Prods. Corp.).
- 2,4,4'-Bis(dimethylaminobenzoyl)-5-dimethylaminobenzoic acid. No. 2,458,328. C. S. Adams (to National Cash Register Co.).
- Preparing gamma-dialkyl butyronitriles by treating an aldehyde nitrile with an organic peroxide as a catalyst and decarboxylating said aldehyde nitrile. No. 2,458,337. H. A. Bruson and T. W. Riener (to Rohm & Haas Co.).
- Preparing nitriles of adipic and sebacic acids by passing through a packed pyrolysis tube in which a temperature of 350-550°C is maintained a compound in liquid phase selected from the group consisting of the amides and the ammonium salts of adipic and sebacic acids in passing through the tube counter-currently to the liquid, an aliphatic acid anhydride in vapor phase. No. 2,458,373. H. J. Hagemeyer, Jr. (to Eastman Kodak Co.).
- Decolorization of esters of acrylic and α -alkyl-acrylic acids by treating with an aqueous solution of an alkali metal bisulfite. No. 2,458,450. W. P. Utermohlen, Jr. (to Eastman Kodak Co.).
- Epoxidation of water immiscible organic compounds selected from the group consisting of acids, esters and amides, said compounds containing a long chain unsaturated aliphatic group which comprises reacting with aqueous peracetic acid. No. 2,458,484. D. E. Terry and D. H. Wheeler (to General Mills, Inc.).
- Preparing 1-amino-4-substituted- α -tetrahydro-2-naphthols by hydrolyzing a 4-substituted- α -tetrahydro- β -naphthoxazoline. No. 2,458,485. C. G. Vogt and J. M. Wilkinson, Jr. (to General Aniline & Film Corp.).
- Liquid purification of cooled coke-oven gas. No. 2,458,505. Fred Denig (to Koppers Co., Inc.).
- Nuclear acylation of a thiophene by reacting with an acylating agent selected from the group consisting of acyl halides and anhydrides of carboxylic acids in the presence of a porous, absorptive catalyst, comprising silica and at least one oxide of a metal selected from the group consisting of those in group IV, sub-group A, and those in the iron sub-group, of Group VIII. No. 2,458,512. Howard D. Hartough and Alvin I. Kosak (to Socony-Vacuum Oil Co., Inc.).
- Nuclear acylation of an acylatable thiophene compound by reacting with an acylating agent selected from the group consisting of acyl halides and carboxylic acid anhydrides in the presence of a porous absorptive material impregnated with a strong hydroxy acid and at least one element selected from the group consisting of sulphur, phosphorus, and fluorine. No. 2,458,513. Howard D. Hartough and Alvin I. Kosak (to Socony-Vacuum Oil Co., Inc.).
- Continuous process for the acylation of thiophene, comprising reacting with an acylating agent selected from the group consisting of acyl halides and carboxylic acid anhydrides in the presence of ortho phosphoric acid as a catalyst. No. 2,458,514. John Kellett, III, and Herbert E. Rasmussen (to Socony-Vacuum Oil Co., Inc.).
- Nuclear acylation of a thiophene comprising reacting a thiophene with an acylating agent selected from the group consisting of acyl halides and anhydrides of carboxylic acids in the presence of a porous absorptive silica-alumina catalyst. No. 2,458,519. Alvin I. Kosak and Howard D. Hartough (to Socony-Vacuum Oil Co., Inc.).
- Nuclear acylation of an acylatable thiophene compound which comprises reacting with an acylating agent selected from the group consisting of acyl halides and carboxylic acid anhydrides in the presence of a strong hydroxy acid containing at least one element selected from the group consisting of sulfur, phosphorus and fluorine. No. 2,458,520. Alvin I. Kosak and Howard D. Hartough (to Socony-Vacuum Oil Co., Inc.).
- Continuous vapor-phase process for nuclear acylation of thiophenes with an acylating agent selected from the group consisting of acyl halides and anhydrides of carboxylic acids, comprising passing a mixture of said thiophene and said acylating agent through a bed of porous, absorptive silica-hydroxy metallic oxide catalyst. No. 2,458,521. Alvin I. Kosak and Howard D. Hartough (to Socony-Vacuum Oil Co., Inc.).
- Preparing carbon tetrafluoride by reacting a carbon tetrahalide in which at least one halogen atom is chlorine and the rest are fluorine with anhydrous hydrogen fluoride in the presence of a catalyst of the group consisting of CrF₃ and FeF₃. No. 2,458,551. Anthony Francis Benning, Joseph Dal Park, and Stanley Earl Krahler (to E. I. du Pont de Nemours & Co., Inc.).
- Continuous process for the acylation of thiophene, comprising reacting with an acylating agent selected from the group consisting of acyl halides and carboxylic acid anhydrides in the presence of ortho phosphoric acid as a catalyst. No. 2,458,514. John Kellett, III, and Herbert E. Rasmussen (to Socony-Vacuum Oil Co., Inc.).
- Nuclear acylation of a thiophene comprising reacting a thiophene with an acylating agent selected from the group consisting of acyl halides and anhydrides of carboxylic acids in the presence of a porous absorptive silica-alumina catalyst. No. 2,458,519. Alvin I. Kosak and Howard D. Hartough (to Socony-Vacuum Oil Co., Inc.).
- Refining fatty oils by admixing sulfuric acid with an impure fatty oil and incorporating bleaching earth. No. 2,458,554. Don Sheldon Bolley and Edwin Charles Gallagher (to National Lead Co.).
- Reduction of compounds of silicon and halogen. No. 2,458,703. David B. Hatcher (to Libbey-Owens-Ford Glass Co.).
- Preparing methoxyacetic acid by non-catalytically reacting monochloroacetic acid with methanol. No. 2,458,741. Louis Schmerling (to Universal Oil Products Co.).
- Removing small contaminating amounts of alkyl ethers from alkyl halides by contacting with silica gel. No. 2,458,819. Howard L. Yowell and Charles E. Morrell (to Standard Oil Development Co.).
- Beta-(beta-dialkylaminoethyl-mercapto)-ethyl alkoxyl-benzoate. No. 2,458,823. Souren Avakian (to National Drug Co.).
- Production of methylfuran from furfural by passing hydrogen admixed with furfural over a catalyst prepared by reducing an acid-leached copper calcium chromate. No. 2,458,857. Iral B. Johns and Llewellyn W. Burnette (to Iowa State College Research Foundation).
- Acrylic esters of ether-alcohols. No. 2,458,888. Chessie E. Rehberg and Charles H. Fisher (to U.S.A. by Sec. of Agriculture).
- Electrolytic process for reducing sugars. No. 2,458,895. Henry Jermain Creighton and Ralph A. Hales (to Atlas Powder Co.).
- Organo-siloxanes. No. 2,458,944. James Franklin Hyde (to Corning Glass Works).
- Preparation of carbon black from methylene chloride. No. 2,458,996. Robert E. Kinney and Everett Gorin (to Socony-Vacuum Oil Co., Inc.).
- Producing a nitro acrylarylide of the benzene series which comprises reacting a solution of the corresponding amine in a water immiscible inert organic solvent with an acylating agent and nitrating with nitric acid without isolating the acrylarylide. No. 2,459,002. Robert Prescott Parker, Richard Franklin Reeves and Robert Carland Conn (to American Cyanamid Co.).
- Manufacturing dimethyl terephthalate by reacting terephthalic acid and methanol in the presence of sulfuric acid. No. 2,459,014. Robert M. Cavanaugh and James E. Lufkin (to E. I. du Pont de Nemours & Co., Inc.).
- Photochemical vapor phase chlorination of paraffinic hydrocarbons of 3 to 7 carbon atoms to yield predominantly the monochloride substantially free from decomposition and secondary reaction products. No. 2,459,049. James S. Sconce and Arnold N. Johnson (to Hooker Electrochemical Co.).
- Separation of oleic and linoleic acids substantially free from saturated acids by extracting with a low boiling aliphatic ketone. No. 2,459,054. Charles C. Towne (to Texas Co.).
- Preparing alkyl acetoxy acrylates by reacting, in dialkyl ether solution, an alkyl α -metalloyl-formyl-acetate with a lower aliphatic carboxylic acid halide and neutralizing. No. 2,459,059. Robert D. Babson (to Merck & Co., Inc.).
- Quaternary ammonium compounds. No. 2,459,062. Elmer W. Cook and Philip H. Moss (to American Cyanamid Co.).
- Divalent metal salts of halogen substituted phenyl sulfides. No. 2,459,063. Elmer W. Cook and Philip H. Moss (to American Cyanamid Co.).
- Preparing 1,1,3,3-tetraalkoxy-propanes by reacting an ester of orthoformic acid with a vinyl ester in the presence of an acid-reacting halide catalyst. No. 2,459,076. M. E. Hultquist (to American Cyanamid Co.).
- Aliphatic amide-substituted propyl quaternary ammonium compounds. No. 2,459,088. Philip H. Moss and Elmer W. Cook (to American Cyanamid Co.).
- A phosphorus- and sulfur-containing reaction product obtained by reacting phosphorous pentasulfide with a sulfurized ketone, said sulfurized ketone being obtained by sulfurizing an unsaturated acyclic ketone with elementary sulfur. No. 2,459,090. Ferdinand P. Otto and Ronald E. Meyer (to Socony-Vacuum Oil Co., Inc.).
- Pantoylauramides. No. 2,459,111. Willard H. Miller and Richard O. Roblin, Jr. (to American Cyanamid Co.).
- Dehydrating monoamides by heating the amide with phosphorus oxychloride in the presence of an inorganic sulfite. No. 2,459,128. Marvin Jay Fahrenbach (to American Cyanamid Co.).
- Purifying carbazole containing 2-amino diphenyl by dissolving impure carbazole in a water-immiscible volatile organic solvent, mixing the thus-formed solution with a dilute aqueous solution of a strong mineral acid. No. 2,459,135. Bernard W. Rottschaefer (to General Aniline & Film Corp.).
- Producing malonic ester, the step which comprises heating a mixture which comprises sodium cyanoacetate, sodium chloride, ethanol, sulfuric acid and benzene. No. 2,459,144. Charles F. Christie (to Eli Lilly & Co.).
- Purifying 4-picoline which is contaminated with 3-picoline, comprising adding o-phenylphenol and a hydrocarbon solvent. No. 2,459,146. Robert S. Bowman (to Jones & Laughlin Steel Corp.).
- Separating a mixture of the pyridine bases 3-picoline, 4-picoline and 2,6-lutidine which comprises adding benzoic acid and toluene, cooling, whereby the 2,6-lutidine benzoate is caused to crystallize, separating the 4-picoline benzoate is caused to crystallize, separating these crystals from the liquid, and regenerating the pyridine bases from their respective benzoates. No. 2,459,191. Kenneth H. Slagle and Robert S. Bowman (to Jones & Laughlin Steel Corp.).
- Treating a liquid mixture of 3-picoline and at least one of the other pyridine bases 4-picoline and 2,6-lutidine which comprises adding salicylic acid, cooling to cause crystallization of the salicylates other than 3-picoline but to retain 3-picoline salicylate as a liquid, separating the solid salicylates from the liquid, and recovering the pyridine bases from their salicylates. No. 2,459,192. Kenneth H. Slagle and Robert S. Bowman (to Jones & Laughlin Steel Corp.).
- Production of pyrazole-5-ones. No. 2,459,226. John David Kendall and Douglas James Fry (to Ifford, Ltd.).
- Amino methyl phenols. No. 2,459,338. Albert L. Rawlins, Walter F. Holcomb, Eldon M. Jones, Frank H. Tendick and Joseph H. Burckhalter (to Parke, Davis & Co.).
- Purifying 3-picoline that is contaminated with at least one of the bases 4-picoline and 2,6-lutidine, comprising heating with formaldehyde and an acid salt of a secondary amine adding water and extracting and recovering 3-picoline. No. 2,459,359. Robert S. Bowman (to Jones & Laughlin Steel Corp.).
- Lactone of 3-carboxy-4-hydroxymethyl-5-hydroxy-6-methyl-2-pyridone. No. 2,459,360. William F. Bruce (to Wyeth, Inc.).
- 1,4-diheterocyclic substituted piperazines. No. 2,459,367. John Joseph Denton and Kenneth Leon Howard (to American Cyanamid Co.).
- Amino aliphatic guanamines. No. 2,459,397. Jack Theo Thurston (to American Cyanamid Co.).
- Azeotropic distillation of 2,3-dimethylbutadiene from methyl pentadiene. No. 2,459,410. R. C. Brandon (to Standard Oil Development Co.).
- B-amino-a-chloroacrylonitriles. No. 2,459,420. John G. Erickson (to American Cyanamid Co.).
- Reacting organic compounds with a hydrogen halide which comprises contacting a hydrogen halide with an organic reactant while at least one of said halide and said reactant is dissolved in liquid sulphur

- dioxide. No. 2,459,423. Arthur Ira Gebhart (to Colgate-Palmolive-Peet Co.).
- Producing ethylene cyanohydrin which comprises bringing ethylene oxide together with hydrocyanic acid into contact with a compound selected from the group consisting of magnesium oxide, magnesium hydroxide, and magnesium cyanide. No. 2,459,430. Albert W. Jelts and Joseph A. Schmidlein (to American Cyanamid Co.).
- Separating the cineole and hydrocarbon constituents of a mixture containing cineoles and hydrocarbons of similar boiling range which comprises subjecting said mixture to fractional azeotropic distillation in the presence of phenol as the azeotropic agent. No. 2,459,432. Harold E. Johnson (to Hercules Powder Co.).
- Separating the cineole and hydrocarbon constituents of a mixture containing cineoles and hydrocarbons of similar boiling range by fractional azeotropic distillation in the presence of phenol as the azeotropic agent, recovering hydrocarbon-phenol azeotrope and cineole-phenol azeotrope separate fractions, and subjecting each to fractional steam distillation with water reflux. No. 2,459,433. Harold E. Johnson and Harold M. Spurlin (to Hercules Powder Co.).
- Producing wax esters of hydrocarbon sulfonates. No. 2,459,440. Eugene Lieber and Aloysius F. Cashman (to Standard Oil Development Co.).
- Recovering piperylene from a mixture of hydrocarbons by reacting piperylene with liquid sulfur dioxide to form piperylene monosulfone. No. 2,459,454. Richard F. Robey (to Standard Oil Development Co.).
- Forming an alkyl-substituted halogenoalkane which comprises reacting with silicon a mixture comprising (1) an ether corresponding to the general formula ROR' where R and R' are each an alkyl group having from 1 to 4 carbon atoms and (2) a hydrogen halide. No. 2,459,539. Eugene G. Rochow (to General Electric Co.).
- Concentrating and separating an o-tertiarybutyl-p-alkoxyphenol from a m-tertiarybutyl-p-alkoxyphenol which comprises dissolving the mixture of phenols in a water-immiscible organic solvent and thereafter contacting the resulting phenol-solvent solution with an aqueous caustic solution to form a raffinate phase and an extract phase. No. 2,459,540. Robert H. Rosenwald (to Universal Oil Products Co.).
- Producing an alkyl norcamphanyl ether which comprises reacting an alcohol and a 2-halo-bicyclo-(2,2,1)-heptane. No. 2,459,544. Louis Schmerling (to Universal Oil Products Co.).
- Refining crude sulphate turpentine which comprises extracting odor-producing compounds with an aqueous solution containing sodium hydroxide, sodium carbonate and sodium sulfide. No. 2,459,570. George H. McGregor (to Minnesota and Ontario Paper Co.).
- Producing 2,6-di-tertiary-butylphenol by alkylating a p-halo-phenol with isobutylene in the presence of an alkylation catalyst to 2,6-di-tertiary-butyl-4-halo-phenol and then removing the halogen therefrom by reaction with an alkali metal in the presence of anhydrous ammonia. No. 2,459,597. Gordon H. Stillson and David W. Sawyer (to Gulf Research & Development Co.).
- Converting acrolein to acrylic acid which comprises eliminating carbon-to-carbon unsaturation of the acrolein by adding a molecule of acetic acid thereto at the olefinic bond, oxidizing the product of the addition to convert the formyl group thereof to carboxyl by treatment with molecular oxygen in the presence of an oxidation catalyst, and then removing the molecule of acetic acid from the oxidation product by pyrolysis to obtain acrylic acid. No. 2,459,677. Scaver A. Ballard and Bradford P. Geyer (to Shell Development Co.).
- Esters of cis-3,6-endomethylene hexahydrophthalyl lactone by heating a half ester of cis-3,6-endomethylene- Δ^4 -tetrahydrophthalic acid and a monohydric aliphatic alcohol of 3 to 12 carbon atoms with a small proportion of water and of sulfuric acid. No. 2,459,684. Willard J. Croxall and Harry T. Neher (to Rohm & Haas Co.).
- Acetoxy-aliphatic amides by reacting the corresponding hydroxy aliphatic nitrile with glacial acetic acid and hydrogen chloride. No. 2,459,686. Harold S. Davis (to American Cyanamid Co.).
- Oxidation of cycloaliphatic hydrocarbons and alcohols with nitric acid. No. 2,459,696. Thomas F. Doumani, Clarence S. Coe and Edward C. Attané, Jr. (to Union Oil Co. of Calif.).
- Manufacture of nornicotine in which the starting material is myosmine, comprising reacting the myosmine with hydrogen in the presence of a catalyst, chosen from the group consisting of platinum oxide, palladium oxide, and a mixture of platinum oxide and palladium oxide. No. 2,459,696. Paul G. Haines, Abner Eisner and Charles F. Woodward (to U.S.A. by Sec. of Agriculture).
- Preparing carboxylic acid amides by heating an aqueous mixture comprising essentially sulfur, ammonia, and a member of the group consisting of alkyl nitrates, aralkyl nitrates, secondary alcohols, and tertiary alcohols. No. 2,459,706. John A. King (to Withrop-Stearns, Inc.).
- Composition consisting of an aqueous dispersion of egg white solids and sodium isopropyl naphthalene sulphonate. No. 2,459,708. Harold P. Lundgren (to U.S.A. by Sec. of Agriculture).
- Preparing guanamines by heating a guanide. No. 2,459,710. Johnstone S. Mackay and Joseph H. Paden (to American Cyanamid Co.).
- 1,5 di(hydroxy methyl)dithiobutret. No. 2,459,725. Russell L. Sperry (to American Cyanamid Co.).
- Thiazyl sulfenamides. No. 2,459,736. George E. P. Smith, Jr., and Edward L. Carr (to Firestone Tire & Rubber Co.).
- Purifying a phenol sulfide obtained by reacting a phenol with a sulfur chloride, comprising extracting with an aqueous solution of a sulfite. No. 2,459,754. Harry E. Albert (to Firestone Tire & Rubber Co.).
- N-monochlorocyclohexylamine. No. 2,459,759. Glen Alliger (to Firestone Tire & Rubber Co.).
- Distilling 2,3-dichlorobutadiene-1,3 through a reflux column, the metallic interior surfaces of which are coated with sodium silicate. No. 2,459,760. Robert T. O'Donnell (to Firestone Tire & Rubber Co.).
- Heating monochlorinated ethylene fluoride in the presence of at least sufficient chlorine to form dichlorodifluoromethane. No. 2,459,767. John D. Calfee and Lee B. Smith (to Allied Chemical & Dye Corp.).
- Making quinuacrine by reacting 2-methoxy-6,9-dichloracridine and 1-diethylaminoethyl-4-aminopentane in the presence of phenol. No. 2,459,777. Gail L. Shaw and Reuben G. Jones (to Eli Lilly and Co.).
- Perhalo(trifluoromethyl)benzene containing chlorine and having at least one fluorine atom attached to the benzene ring. No. 2,459,779. Waldo Research Foundation.
- B. Liggett, B. L. McBee and Vincent V. Lindgren (to Purdue Research Foundation).
- Anellated polycarbocyclic perfluorocompounds. No. 2,459,780. Earl T. McBee and Lavon D. Bechtol (to Purdue Research Foundation).
- Anellated fluorocarbons. No. 2,459,781. Earl T. McBee and Lavon D. Bechtol (to Purdue Research Foundation).
- Anellated fluorocarbons. No. 2,459,782. Earl T. McBee and Lavon D. Bechtol (to Purdue Research Foundation).
- In the process for the preparation of a 1,2-dichlorofluorocycloalkene halocarbon, wherein the 2 chlorine atoms are attached to the 2 olefinic carbon atoms of the single double bond the step which includes treating an unsaturated cyclic chlorocarbon with antimony pentafluoride at a fluorinating temperature to produce a 1,2-dichlorofluorocycloalkene halocarbon. No. 2,459,783. Earl T. McBee and Park A. Wiseman (to Purdue Research Foundation).
- 2-(4' carboxy-butyl)-3:4-di(acylamido)-4:5 dihydrothiophene and its esters. No. 2,459,817. Stanton A. Harris and Glen E. Arth (to Merck & Co., Inc.).
- A hydrophenanthrene which is saturated at least in the 1-, 2-, 3-, and 4-positions and which contains as sole substituents, an alkyl group in each of the 1- and 2-positions, a member selected from the class consisting of the carboxylic acid and carboxylic acid ester groups in the 2-position, and a member selected from the class consisting of phenolic hydroxyl and etherified phenolic hydroxyl in the 7-position. No. 2,459,834. Karl Miescher and Jules Heer and Jean Rene Billter (to Ciba Pharmaceutical Products, Inc.).
- Alkylating dihydroxybenzene by dissolving the dihydroxybenzene in an acid reacting buffer solution, adding alkyl halide in the presence of a base. No. 2,459,835. Kenneth P. Monroe (to Koppers Co.).
- Process for the preparation of hydroxy-hydrophenanthrene carboxylic acids and esters. No. 2,459,949. Karl Miescher and Georg Anner (to Ciba Pharmaceutical Products, Inc.).
- Hydrophenanthrene carboxylic acid intermediates. No. 2,459,950. Karl Miescher and Georg Anner (to Ciba Pharmaceutical Products, Inc.).
- Manufacture of maleamic acid which comprises passing ammonia into a solution of maleic anhydride. No. 2,459,964. Ralph Sidney Robinson and Ernst Ludwig Humburger (to Beck, Koller & Co. (England), Ltd.).
- Quaternary ammonium compounds. No. 2,459,994. Melvin De Groote and Bernhard Keiser (to Petrolite Corp., Ltd.).
- Amidization of pyridine monocarboxylic acid compounds of the class consisting of pyridine monocarboxylic acids and their ammonium salts by reacting with urea in the presence of a boron catalyst. No. 2,460,002. Paul W. Garbo.
- Phosphoric acid esters. No. 2,460,043. Wilber O. Teeters (to Allied Chemical & Dye Corp.).
- 2-chloro-4-aminobenzoic acid esters of the N-alkyl substituted alkyl amino alcohols having less than 6 carbon atoms and their addition salts. No. 2,460,139. Henry C. Marks and Martin I. Rubin (to Wallace & Tiernan Products, Inc.).
- Preparation of meta-hydroxy-omega-methylaminoacetophenone. No. 2,460,143. Maurice L. Moore and John R. Corrigan (to Sterling Drug, Inc.).
- Hydroxyphenyl alkanolamines. No. 2,460,144. Maurice L. Moore and John R. Corrigan (to Sterling Drug, Inc.).
- Basic esters of aliphatic tertiary carboxylic acids. No. 2,460,182. Henry Martin and Alfred Margot (to J. R. Geigy A. G.).
- Reacting an N-acylamino acid with a dialkyl sulfite in the presence of the corresponding alcohol and an acidic catalyst to form an N-acylamino ester. No. 2,460,191. Richard F. Phillips (to Merck & Co., Inc.).
- Sulfonium methosulfates. No. 2,460,223. John N. Hansen (to Dow Chemical Co.).
- Compound selected from the class consisting of aryl, alkyl and arylalkyl esters of 2-(omega-carboxy-alkylidene)-3-isomethyl-4-acylamido-tetrahydrothiophene. No. 2,460,224. Stanton A. Harris and Karl Folkers (to Merck & Co., Inc.).
- Compound selected from the group which consists of oximes, arylhydrazones and semi-carbazones of 2-(omega-carboxy-alkylidene)-3-keto-4-acylamido-tetrahydrothiophene, and alkyl, aryl, and arylalkyl esters thereof. No. 2,460,225. Stanton A. Harris and Karl Folkers (to Merck & Co.).
- Butylidene substituted tetrahydrothiophenes. No. 2,460,226. Stanton A. Harris and Glen E. Arth (to Merck & Co., Inc.).
- Esters of sulfone haloalcohols. No. 2,460,233. Rupert C. Morris, Edward C. Shokal and John L. Van Winkle (to Shell Development Co.).
- Resolution of racemic α hydroxy β , β dimethyl γ butyrolactone. No. 2,460,239. Frank D. Pickel, Jacob I. Fass and Saul Chodroff (to Nopco Chemical Co.).
- Resolution of racemic α hydroxy β , β dimethyl γ butyrolactone. No. 2,460,240. Frank D. Pickel, Jacob I. Fass and Saul Chodroff (to Nopco Chemical Co.).
- Production of nitroaliphatic olefins containing from 4-8 carbon atoms which comprises reacting a nitrate of a saturated nitroaliphatic hydrocarbon of from 4-8 carbon atoms in an aqueous medium with a substance selected from the group consisting of alkali carbonates, bicarbonates, hydroxides; alkaline earth metal carbonates, borates, hydroxides; and ammonium carbonate, bicarbonate, hydroxide. No. 2,460,243. Charles William Scaife, Arthur Ernest Wilder Smith and Harold Baldock, deceased (to Imperial Chemical Industries, Ltd.).
- γ -phenyl- β -nitroalkanol. No. 2,460,265. John B. Tindall (to Commercial Solvents Corp.).
- Preparation of terpene alcohols having a plurality of C_6H_5 units by treating isoprene with dichloroacetic acid. No. 2,460,291. Madison Lee (to E. I. du Pont de Nemours & Co.).
- 2-benzimidazolyl-amino pyrimidines. No. 2,460,409. Frederick Robert Basford, Francis Henry Swinden Curd and Francis Leslie Rose (to Imperial Chemical Industries, Ltd.).
- A hydrocarbonmercapto monohydric alcohol ester of a polybasic carboxylic acid. No. 2,460,436. Bernard H. Shoemaker, Chester E. Adams and Wayne A. Proell (to Standard Oil Co.).
- Manufacture of trichloromethyl diaryl methanes. No. 2,460,535. John W. Robinson (to E. I. du Pont de Nemours & Co.).
- Reacting vinyl cyanide with a compound containing a reactive methylene group in the presence of an alkaline catalyst. No. 2,460,536. Arthur O. Rogers (to E. I. du Pont de Nemours & Co.).
- Chlorination of phthalic anhydride by introducing chlorine into molten phthalic anhydride containing iron powder as a source of ferric chloride catalyst. No. 2,460,564. Thad M. Amacker (to B. F. Goodrich Co.).
- Producing monochlorophthalic anhydride by passing a gaseous mixture of phthalic anhydride and chlorine over a catalyst comprising a solid polyvalent metal chloride selected from the group consisting of thorium chloride, cupric chloride, ferric chloride, calcium chloride, platinum and ammonium chloride. No. 2,460,565. Thad M. Amacker (to B. F. Goodrich Co.).
- Reaction products of thiuram disulfides and alkylene imines. No. 2,460,581. Jacob Eden Jansen (to B. F. Goodrich Co.).
- Generation of monomeric formaldehyde gas from formaldehyde polymers. No. 2,460,592. Arthur R. Miller, Jr. (to B. F. Goodrich Co.).
- Preparation of alpha-cyanoethyl acetate by mixing acetone cyanhydrin, vinyl acetate and an alkaline catalyst. No. 2,460,603. Waldo L. Semon (to B. F. Goodrich Co.).
- In a method for the conversion of an isopropyl group on an aromatic ring containing from 1-3 alkyl substituents to a pentachloroethyl group, the step of reacting the aromatic compound with chlorine in the presence of actinic light. No. 2,460,705. Earl T. McBee and Ogden R. Pierce (to Purdue Research Foundation).
- Reacting α -amino- β -methoxyisovaleric acid with aqueous sodium acetate and acetic anhydride to produce α -acetamidoo- β , β -dimethylacrylic acid. No. 2,460,708. Ralph Mazingo and Karl Folkers (to Merck & Co., Inc.).
- A saturated diamine having the formula $C_nH_{2n+2}N_2$, containing 2 primary amine groups, obtained by treating dimerized octadecadienonitrile with hydrogen in the presence of a hydrogenation catalyst. No. 2,460,733. Herman A. Brunson and Warren D. Niederhauser (to Rohm & Haas Co.).

Preparing n-alkylated compounds of condensed arylpyrroles. No. 2,460,745. Henry W. Grimmel and Harlan B. Freyermuth (to General Aniline & Film Corp.).

5-alkoxy-alkyl-5-cyclohexyl hydantoin. No. 2,460,747. Henry R. Henze (to Parke, Davis & Co.).

Preparing oleonitrile from the reaction of oleic acid stock with ammonia. No. 2,460,772. Lou A. Stegmeyer (to Emery Industries, Inc.).

Preparing 2-amino-3-carboxymethylmercapto-propanoic acid by reacting cystine, chloroacetic acid and zinc. No. 2,460,785. Earl Pierson and Max Tishler (to Merck & Co., Inc.).

Preparing methacrylonitrile and α -chloroisobutyronitrile by reacting tri- α -cyanoisopropyl phosphite with chlorine and pyrolyzing. No. 2,460,788. Le Roy U. Spence and Emile H. Sakal (to Rohm & Haas Co.).

Alkylation of phenol by alkyl halides catalyzed by finely divided gels of certain drying oils. No. 2,460,793. Charles J. Plank and John F. Socolofsky (to Socony-Vacuum Oil Co.).

Canadian

Co-dimer of chlorotrifluoroethylene and 1,1-dichloro-2,2-difluoroethylene. No. 453,791. Edward L. Kropa and John J. Padbury (to American Cyanamid Co.).

Manufacture of derivatives of guanidine by allowing nitrous acid to react with an aryl guanidine. No. 453,832. Joseph Arthur Teicher and Douglas Frank Twiss (to Dunlop Tire and Rubber Goods Co., Ltd.).

3-(bis-dihydroxypropyl) - amino-4-hydroxy - 5-acetylamino - 3'-amino-4'-hydroxyarsenobenzene-monosulphoxylate. No. 453,929. Alfred Fehrlé and Paul Fritzsche.

Arsenobenzene compound. No. 453,930. Alfred Fehrlé, Walter Herrmann and Hans Hilmer.

2-Halogenoethoxy silicon compounds. No. 453,987. W. I. Patnode and R. O. Sauer (to Canadian General Electric Co., Ltd.).

Oxidizing naphthalene to phthalic anhydride by reacting naphthalene vapor and an oxygen-containing gas in the presence of finely divided solid catalyst suspended therein. No. 454,040. E. V. Murphree, C. W. Tyson, D. L. Campbell and H. Z. Martin (to Standard Oil Development Co.).

Producing 2-aminopyrazine by reacting with a member of the group consisting of alkali metal amides and alkaline earth metal amides. No. 454,124. Moses L. Crossely and Jackson P. English (to American Cyanamid Co.).

Producing 2-aminoxazole by reacting urea with a member of the group consisting of chloro acetaldehyde and bromo acetaldehyde. No. 454,125. George W. Anderson (to American Cyanamid Co.).

Producing piperazines from aliphatic hydroxy amines which comprises vaporizing an aliphatic hydroxy amine selected from the group consisting of ethanol amine, 2-hydroxyethyl ethylene diamine, their α -alkyl substituted homologs and the volatilizable salts thereof and passing the vapors over a dehydration catalyst. No. 454,126. Harry F. Pfann (to American Cyanamid Co.).

Production of the lactam of 2-methyl-3-amino-4-carboxy-5-aminomethyl pyridine by treating an acid salt of 2-methyl-3-amino-4-carboxy-5-aminomethyl pyridine with a base. No. 454,128. John Halley Mowat (to Lederle Laboratories, Inc.).

3-methyl-5-ureido-1,2,4-oxadiazole. No. 454,129. Donald W. Kaiser (to American Cyanamid Co.).

Preparing 2-bromopyrazine by contacting an acid salt of pyrazine with bromine and heating. No. 454,130. James K. Dixon and John M. Sayward (to American Cyanamid Co.).

Modified lecithin derived from a lecithin having an unsaturated carbon-carbon linkage in a higher fatty acid group, said modified lecithin having an OX group attached to a carbon atom of said linkage, X being selected from the group consisting of hydrogen and an acyl group of a low aliphatic acid. No. 454,175. Harold Witteoff (to General Mills, Inc.).

6-methoxy-8-(2-butylaminoethylamino) quinolines. No. 454,194. Horace Abbott Shonle and Ewald Rohrmann (to Eli Lilly and Co.).

Monomeric butadiene stabilized with 4-tertiary-butyl catechol. No. 454,232. Lewis F. Hatch, David E. Adelson and Billee O. Blackburn (to Shell Development Co.).

Monomeric butadiene stabilized with para-amino-phenol. No. 454,233. Lewis F. Hatch, David E. Adelson and Billee O. Blackburn (to Shell Development Co.).

Production of ethylene dichloride by reacting ethyl alcohol with hydrogen chloride and oxygen in the presence of a catalyst comprising cupric chloride, an adsorptive alumina and sodium chloride. No. 454,235. Harry A. Cheney (to Shell Development Co.).

Preparing tetrakis-2-chloroethyl silicate by reacting ethylene oxide with silicon tetrachloride. No. 454,285. Winton I. Patnode and Robert O. Sauer (to Canadian General Electric Co., Ltd.).

Treating the lithium derivative of alpha-picoline with an anhydride of an aliphatic acid. No. 454,305. William L. Ruigh (to Merck & Co., Inc.).

Heating a substance selected from the group consisting of 2-amino-3-carboxyl-monomethyl pyrazine, 2-amino-3-carboxyl-5, 6-dimethyl pyrazine, 2-hydroxy-3-carboxyl-monomethyl pyrazine, 2-hydroxy-3-carboxyl-5, 6-dimethyl pyrazine, 2-amino-3-carboxyl-5, 6-diphenyl pyrazine, and alkali metal salts thereof, in sulfuric acid. No. 454,306. John Wejland and Max Tishler (to Merck & Co., Inc.).

Pyridine Derivatives. No. 454,308. Stanton A. Harris (to Merck & Co.).

2-methyl-3-nitro-4-aryloxymethyl-5-cyano-6-halo-pyridine. No. 454,309. Stanton A. Harris (to Merck & Co., Inc.).

2-methyl-3-hydroxy-4-ethoxymethyl-5-hydroxy-methylpyridine hydrochloride. No. 454,310. Stanton A. Harris (to Merck & Co., Inc.).

Separating theophylline with unsubstituted No. 7 position from caffeine with substituted No. 7 position, which consists in treating solutions with cupric ion in the presence of a reducing agent in acid form, and precipitating insoluble cuprous salt of the theophylline while leaving the caffeine in solution. No. 454,414. Louis Lauffer and Jesse Charney (to Schwarz Laboratories, Inc.).

In the process of manufacturing dienes, the steps comprising thermally cracking normally liquid polymer of propylene. No. 454,416. Martin de Simo and Robert M. Roberts (to Shell Development Co.).

Producing trichloropropionic acid by hydrolyzing trichloropropionitrile in a sulfuric acid bath. No. 454,433. Joy Gabriel Lichty (to Wingfoot Corp.).

Producing a propionyl halide by pyrolyzing a dihalo propionyl halide. No. 454,434. Frederic Charles Schaefer (to Wingfoot Corp.).

Preparing dichlorosuccinic anhydride by treating molten maleic anhydride with gaseous chlorine. No. 454,435. Albert Mitchell Clifford and John Royer Long (to Wingfoot Corp.).

Petroleum

Removing mercaptans from a sour light naphtha substantially free of phenols by contacting with a caustic alkali solution containing phenols as a solvent. No. 2,457,975. J. A. Bolt (to Standard Oil Co.).

In the heating of hydrocarbons containing a neutral organic sulfate, the improvement which comprises heating in the presence of a solid, substantially anhydrous, basic substance. No. 2,458,049. H. S. Bloch and G. L. Hervet (to Universal Oil Prods. Co.).

Separating olefins from paraffins by contacting a mixture with a solution of a silver salt in acetonitrile. No. 2,458,067. B. S. Friedman and R. F. Stedman (to Universal Oil Prods. Co.).

Conversion of liquid hydrocarbons with a moving catalyst to lower boiling hydrocarbons. No. 2,458,162. W. A. Hagerbaumer (to Socony-Vacuum Oil Co.).

Conversion of fluid hydrocarbons in the presence of a particle-form contact mass material. No. 2,458,165. H. K. Holm (to Socony-Vacuum Oil Co.).

Method and apparatus for conversion of fluid hydrocarbons in the presence of a moving particle-form contact. No. 2,458,498. Eric V. Bergstrom (to Socony-Vacuum Oil Co., Inc.).

Method and apparatus for conversion of fluid hydrocarbons in the presence of a particle-form contact mass material. No. 2,458,499. Eric V. Bergstrom (to Socony-Vacuum Oil Co., Inc.).

Purification of a hydrocarbon stock containing an aromatic hydrocarbon and olefinic impurities for removal of this olefinic impurity by contacting with an aluminum chloride hydrocarbon complex. No. 2,458,777. Harold J. Hepp and Howard R. Sailors (to Phillips Petroleum Co.).

Producing normally liquid hydrocarbons from a normally gaseous olefin with a catalyst composed of an inorganic hydrogel selected from the group consisting of silica, alumina, and magnesia, containing titanium oxide dispersed within its gel structure, by hydrolyzing titanium sulphate in an alkaline metal carbonate solution mixed with the said hydrogel. No. 2,458,818. David W. Young (to Standard Oil Development Co.).

Forming hydrocarbons and oxygenated hydrocarbons which comprises reacting carbon monoxide and hydrogen in the presence of a powdered iron catalyst, which catalyst is maintained in the reactants, in the form of a dense fluidized mass. No. 2,458,870. Henry J. Ogorzaly (to Standard Oil Development Co.).

Polymerization of olefins comprising admixing an olefin with a solution of metallic halide catalyst in a solvent. No. 2,458,977. Don R. Carmody (to Socony-Vacuum Oil Co., Inc.).

Method and apparatus for fluid hydrocarbon conversion. No. 2,459,096. Frederick E. Ray (to Socony-Vacuum Oil Co., Inc.).

Trademarks of the Month

A Checklist of Chemical and Chemical Specialties Trademarks

Here Comes LOO LOO. Cleaner for removing grease and dirt. 463,933. Loo Loo.

PLASTAPE. Sealing tapes. 482,088. Bemis Bros. Bag Co.

DB-50. Insecticides. 492,511. Pennsylvania Salt Mfg. Co.

AZOFUME-70. Fumigant. 497,492. Plant Products Corp.

OPTILITE. Transparent and translucent plastic material. 498,447. U. S. Safety Service Co.

Nice'n'Brite. Polishing powder for silver, nickel, chrome, and all plated metals. 502,545. Visco Brothers.

Terhune's PURE PLANT FOOD. Fertilizers. 505,626. Kentucky Fertilizer Works.

Lady Carroll. Soap. 505,629. Plymouth Wholesale Dry Goods Corp.

SPEED-BRITE. Wax furniture and automobile polish. 505,630. Speed-Brite Chemical Co.

Oneida Ratsupr. Liquid poison for extermination of rats. 505,632. Oneida Chemical Co.

AIR-CONDITION-AIRE. Chemical for non-acid treatment of water used in evaporative coolers and other air conditioning apparatus. 505,637. Solvent Mfg. Co.

SPECIAL NUTRIENT 114. Refined steepwater used for mold growth in the production of anti-biotics. 505,651. A. E. Staley Mfg. Co.

SPECIAL NUTRIENT 14. Refined steepwater used for mold growth in the production of anti-biotics. 505,652. A. E. Staley Mfg. Co.

SPECIAL NUTRIENT 165. Refined steepwater used for mold growth in the production of anti-biotics. 505,653. A. E. Staley Mfg. Co.

SPECIAL NUTRIENT 4-SX. Refined steepwater used for mold growth in the production of anti-biotics. 505,654. A. E. Staley Mfg. Co.

SPECIAL NUTRIENT 4-S. Refined steepwater used for mold growth in the production of anti-biotics. 505,655. A. E. Staley Mfg. Co.

SPECIAL NUTRIENT 22. Refined steepwater used for mold growth in the production of anti-biotics. 505,656. A. E. Staley Mfg. Co.

AQUABLAK. Colloidal dispersions of various types of carbon blacks in water. 505,887. Binney & Smith Co.

Nu-Klear. Window, mirror, furniture and glass cleaning preparation. 505,891. Nu-Klear.

SPENCER. Ammonium nitrate fertilizer. 505,895. Spencer Chemical Co.

ROCKWELL r. Valve Lubricating greases. 505,899. Rockwell Manufacturing Co.

THE WHITE LINE IS THE CLOXOX LINE. Bleaching, cleansing, antiseptic and germicidal compounds. 505,907. Clorox Chemical Co.

MAKES EVERYTHING SPICK AND SPAN. Soap powder combined with mineral ingredients. 505,912. Cudahy Packing Co.

NU-NAP. Detergent for washing felt. 506,110. Cowles Chemical Co.

SPENCER. Solid carbon dioxide, anhydrous ammonia, nitrogen solution. 506,125. Spencer Chemical Co.

SURE-FLO. Chemical compound used for cleaning drains and sewers. 506,368. Waterworth Corp.

SAFE-TREE. Liquid chemical compound to be applied to trees or the like for preventing flaming thereof. 506,382. Madison Products Co.

Beautykote. Synthetic adhesive cement—namely, synthetic polymer of a resin type for laminating and bonding together wood, textiles, fabrics, paper and various composition material. 507,096. Beautykote Corp.

SUPER-TEX. Synthetic adhesive cement. 507,155. Tex Products, Inc.

PERMA SUDS. Soap. 509,990. Le Blanc Laboratories & Distributing Co.

WREN'S. Boot and shoe polishes. 510,821. Wm. Wren, Ltd.

POLY-SUDS. Granular soap. 510,973. Overton Chemical Co.

EMULPHOGENE. Emulsifying agents. 511,079. General Dyestuff Corp.

KOROSEAL. Impervious corrosion-resistant plastic linings for metal storage tanks. 512,232. B. F. Goodrich Co.

FLORAWAX. Wax emulsion for coating flowers and foliage. 512,272. Florafine, Inc.

D-LUXE. Granular chemical product for cleaning machinery and utensils in the dairy, food and beverage industries. 513,811. Diversey Corp.

HEAVY DUTY. Cleanser. 513,812. Diversey Corp.

PROCENE. Preparation for use as a coating to protect photo-engraving plates from the corrosion of acids. 514,040. Hull Fish Meal and Oil Co., Ltd.

FVM CO. Silver and metal polishes. 514,413. French Veneer Mfg. Co.

SUNICUT. Non-soluble cutting oil. 514,507. Sun Oil Co.

WARCOFIX. Quaternary organic material for processing of textiles, particularly as a fixative for dyestuffs. 515,138. Sun Chemical Corp.

TAT FORMULA '83'. Poisons for rodents, insects, and other pests. 515,956. O. E. Linck Co., Inc.

R-M. Liquid cleaner for lacquered or enamel surfaces. 517,668. Rinshed-Mason Co.

LARCO. Adhesive. 517,678. Western Mineral Products Co.

MYSTIC DRI-QUIK. Dry cleaner. 518,553. Mystic Foam Corp.

APPRATEX. Anionic surface active organic substantive softener for use in the finishing of textiles. 519,844. Sun Chemical Corp.

PARICIN. Saturated fatty acid esters, for use in plasticizing, extending, and diluting paints, varnishes, resins, plastics and rubber. 520,677. Baker Castor Oil Co.

DURIDINE. Chemical preparation of acidic reaction applied to metals in surface finishing processes. 521,423. American Chemical Paint Co.

PROPOCEL. Cellulose ethers and salts thereof. 521,441. Dow Chemical Co.

D. Paint stripper. 522,095. Diversey Corp.

VITRESAN. Water soluble glass, or water-glass used as detergents. 522,563. Economics Laboratory, Inc.

ORLECO. Aniline dyes. 523,798. Orleans Co., Inc.

OET. Surface active agent for addition to bleaching and cleaning preparations. 524,077. Pacific Chemical Co.

PANELYTE. Resinous plastic materials. 524,625. St. Regis Paper Co.

(Symbol). Mineral chemicals, particularly zircon, rutile, ilmenite, garnet, monazite, tourmaline, and chromite. 525,017. Orefraction, Inc.

K Kidde. Carbon dioxide, oxygen and chemical preparations used in the treatment of fibrous materials. 526,658. Walter Kidde & Co., Inc.

Tiolene. Lubricating oils and greases. 527,353. Pure Oil Co.

(Symbol). Ready mixed paints, varnishes, wood stains in the nature of a coating. 527,599. Chi-Namel Paint & Varnish Co.

Kensington. Sudsing cleaner, cleanser, and detergent. 528,042. Hewitt Soap Co., Inc.

National. Adhesives in the form of cements, liquid glues, flexible glues, pastes, and mullage. 528,637. National Starch Products, Inc.

HALLCO. Wax derived from petroleum for use in compounding rubber stocks and for impregnating paper, textiles, and composition sheet material. 528,790. C. P. Hall Co.

GOLD-BOND. Automobile cleaner. 529,459. Gold Bond Products Co.

DURA-CLEAR. Synthetic resinous plastic composition. 529,461. Harwid Co.

DA-S. Magnesia-silica gel catalyst used in the catalytic cracking of hydrocarbons. 529,969. Davison Chemical Corp.

M-S. Gel catalyst in spheroidal form used in the catalytic cracking of hydrocarbons. 529,970. Davison Chemical Corp.

PERMACEL. Heatsealing tape. 530,313. Industrial Tape Corp.

HARLEY-DAVIDSON. Valve grinding compound, and chrome polish and cleaner. 531,117. Harley-Davidson Motor Co.

PARADE. Detergent cleaning powder. 531,238. Par Soap Co.

ELEPHANT BRAND. Chemical fertilizers. 531,314. Consolidated Mining & Smelting Co.

TREX. Emulsifiers for insecticidal materials. 531,791. Griffin Chemical Co.

RIVAL BLUE. Ammonia and bleach. 533,040. Wm. Montgomery Co.

Phelan's. House paint, concrete paint, and paint colors. 533,355. Phelan-Faust Paint Mfg. Co.

NO-DERM. Soap. 533,688. Geo. L. Williams Co.

"METLINK". Marking and stencilling on metals, wood, and paper. 533,910. Markwell Mfg. Co., Inc.

STADLERS TNT SUPERIOR. Fertilizer. 533,937. Stadler Products Co.

DASCOLENE. Cutting oil. 534,685. D. A. Stuart Oil Co., Ltd.

SEPCO-W. Fungicidal compound containing lignin compounds of redwood bark. 535,264. Sequoia Products Co.

Hide Kote. Paints in paste form. 535,564. J. F. Kurfies Paint Co.

SOUTHPORT. Ready-mixed paints. 536,021. Wesson Oil & Snowdrit Co.

Andrew Wilson. Insecticides. 537,267. Andrew Wilson, Inc.

M-I. Paint in paste, powder, and liquid form; varnishes; lacquers; air-drying and baking enamels; and paint, enamel, and lacquer thinners. 538,018. Manufacturing Industries, Inc.

SPRIN-CAL. Calcium chloride. 538,115. Faesy & Besthoff, Inc.

GLO-GREEN. Lubricating oils and greases. 538,199. Topp Oil & Chemical Co.

ATOMITRON. Mineral fertilizer ingredients. 538,316. Scientific Soil Improvement Co.

ELECTRA-SOL. Dishwashing compound. 538,384. Economics Laboratory, Inc.

KLEEN-URN. Preparation for general cleansing and purifying purposes. 538,574. Tomlinson Industries, Inc.

MARAPRENE. Lignin Reinforced rubber. 538,647. Marathon Corp.

ATOLAK. Liquid automobile wax and cleaner. 538,706. Atomix, Inc.

IDENTICOLOR. Ready-mixed paints and paint enamels. 538,777. W. W. Lawrence & Co.

ZIN-CHRO. Paints (ready-mixed and paste form); primers and undercoaters for paints. 538,780. W. W. Lawrence & Co.

CEMENTECT. Paint in dry form. 538,792. W. W. Lawrence & Co.

Minnesota. Ready mixed paints and wood stains. 539,596. Minnesota Linseed Oil Paint Co.

HAVILAND. Paint and paint enamel in liquid form. 539,598. Minnesota Linseed Oil Paint Co.

BLACKEST & QUICKEST IN THE WORLD. Stove polish. 539,620. Nickel Plate Stove Polish Co.

BLACK JACK. Stove polish. 539,621. Nickel Plate Stove Polish Co.

HAND WITCH. Soap. 539,622. Nickel Plate Stove Polish Co.

MERPAKO. Liquid roof paints. 539,890. M. J. Merkin Paint Co.

DEB-O-LIN. Paints sold in paste and liquid form, varnishes, paint and baking enamels, undercoaters, sealers; paint stains sold in liquid form, and liquid paint removers. 540,044. De Boom Paint Co.

DEB-O-TEX. Automotive synthetic paint and baking enamels, undercoaters, reducers, primers, and sealers. 540,048. De Boom Paint Co.

SINGAPORE. Antifouling bottom paint for waterborne craft. 540,675. International Paint Co., Inc.

D.W. Plastic molding powders. 540,799. Duss-Wallace & Co.

"37" LINE. Lacquers. 540,907. Sherwin-Williams Co.

PORENAC. Detergent compound. 540,954. Wyandotte Chemicals Corp.

FIBROLANE. Staple fibre manufactured from casein. 541,648. Courtaulds, Ltd.

MOTH-AWAY. Insecticides. 541,765. O-Cedar Corp.

CHIMIA. Soap. 542,320. Antonio Lopez Jimenez.

(Symbol). Custom mixed paints and paint enamels. 542,323. Martin-Senour Co.

Shastamatic. Water softening equipment wherein resinous and synthetic type zeolites are employed. 542,359. Shastamatic Mfg. Corp.

SEALING LINE. Gummed paper tape. 542,401. Mid-States Gummed Paper Co.

SHASTA. Water softening equipment wherein resinous and synthetic type zeolites are employed. 542,882. Thomas Mfg. Co.

SHASTA. Water softening and conditioning apparatus employing resinous and synthetic type zeolites. 542,883. Thomas Mfg. Co.

CAN-OX. Natural iron oxide pigments. 543,639. Geo. S. Mephram Corp.

MUNN. Rosin. 543,979. Newport Industries, Inc.

ROYCE CHEMICAL CO. Chemicals for dyeing, bleaching, finishing, and treatment of textile fibers and fabrics. 543,994. Royce Chemical Co.

A. Silicate of soda. 544,502. Philadelphia Quartz Co.

G. Silicate of soda. 544,503. Philadelphia Quartz Co.

SNOW WHITE. Toilet soap. 544,751. Snow White Products Co.

GIVAUDAN DELAWANNA, NEW YORK. Organic odoriferous and flavor-imparting chemicals; organic chemicals used in perfumes, cosmetics, paints, varnishes, drying inks, bactericidal, fungicidal, insecticidal, and preservative compositions; and organic chemicals used as rancidity stabilizers in soaps. 544,816. Givaudan-Delawanna, Inc.

Em Bee. Spot cleaner. 546,309. Meyer Brothers.

Sunnyday. Ready mixed paints and paint enamels. 546,436. Spencer-Adams Paint Co.

LO-OX. Stabilized rosin. 546,695. Glidden Co.

AURORAL. Pigment colors used in the manufacture of ink. 547,169. Sun Chemical Corp.

DEEPTONE. Printing ink. 547,172. Sun Chemical Corp.

Electric Eradicator. Printing ink. 547,173. Sun Chemical Corp.

GOLDSHEEN. Printing ink. 547,175. Sun Chemical Corp.

GOLVENEER. Printing ink. 547,176. Sun Chemical Corp.

QUICKSET. Printing ink. 547,181. Sun Chemical Corp.

SILVENEER. Printing ink. 547,184. Sun Chemical Corp.

SILVERSHEEN. Printing ink. 547,185. Sun Chemical Corp.

SUPERSET. Printing ink. 547,186. Sun Chemical Corp.

ULTRAOPAQUE. Printing ink. 547,188. Sun Chemical Corp.

LAUXIZE. Sizing for paper and textiles. 547,863. Monsanto Chemical Co.

DROUGHT. Insecticidal chemical. 549,138. Drought Products.

Tiger Brands. Soluble and emulsifiable oils for treating leather. 549,668. Salem Oil & Grease Co.

D-STRING. Insect repellents. 550,190. D-String Co.

HOMART. Water softener salts of the base exchange type; deodorant and sewage disposal chemicals, pipe solvent (caustic compound); air driers (dehumidifying compound), soot remover (chemical); stop leak compound, boiler cleaning compound. 550,443. Sears, Roebuck & Co.

EASTERN STATES. Fertilizers. 551,253. Eastern States Farmers' Exchange.

EASTERN STATES COOPERATIVE. Cleansing compound for dairy use. 551,258. Eastern States Farmers' Exchange.

BO-PEEP. Fertilizers. 551,852. Gordon Callbeck.

PURINA. Insecticides, fungicides, and vermifuges. 552,716. Ralston Purina Co.

BURRO. Caustic soda. 553,669. Mathieson Chemical Corp.

Beauty in the Morning. Soaps. 553,792. Universal Laboratories, Inc.

ZYMEX. Preparations in dry powder form for use in the processing of textiles. 553,935. Wallerstein Co.

STARSO. Silicate of soda. 554,149. Philadelphia Quartz Co.

ANCHOR BRAND. Super phosphate fertilizer. 554,435. Stauffer Chemical Co.

WEST. Liquid soap, surgical soap, soap, liquid castile soap, powdered soap. 554,458. West Disinfecting Co.

STIMULIZER. Aqueous sulfuric acid solutions for application to slashes in the bark of the trunks of turpentine producing trees to increase the turpentine flow from the tree. 554,460. Allied Chemical & Dye Corp.

XX. Zinc oxide, having a general utility in the industrial arts. 554,690. New Jersey Zinc Co.

REVEILLE RED. Pigments for use in coloring inks. 554,705. Reichhold Chemicals, Inc.

SQ-40. Synthetic detergent compositions. 559,915. Monsanto Chemical Co.

GLOREX. Detergent. 555,324. Jewel Tea Co., Inc.

METEOR. Detergent. 555,533. Jewel Tea Co.

TAKIMERSE. Preparation for removal of stains from fabrics. 555,782. Takamine Laboratory, Inc.

FORMULA 24. Caustic for degreasing heavy industrial equipment. 558,358. Cudahy Packing Co.

GIBSON. Soap polish and a mopping powder. 558,359. Cudahy Packing Co.

MANHATTAN. Scouring powder. 558,361. Cudahy Packing Co.

METEOR. Heavy degreasing and bottle washing compound containing caustic soda. 558,362. Cudahy Packing Co.

PROTEX-LIN. Detergent builder. 558,366. Cudahy Packing Co.

TWIN WHITE. Toilet soap. 558,373. Cudahy Packing Co.

SOLVEX. Cleaning preparation for dissolving wax, oil, dirt and tar from lacquered surfaces. 554,758. American Lacquer Solvents Co.

FOSVEX. Insecticide. 558,975. Westvaco Chemical Corp.

WALTERISATION. Chemical solutions for the prevention of corrosion of metal and alloys. 559,968. Walterisation Co., Ltd.

STEELGARD. Oleaginous material applied straight or in admixture with water to metal surfaces for purposes of protecting metal against rusting. 560,107. Haas-Miller Corp.

PREVOL. Cleaner and deodorant for cleaning and removing rust stains and discolorations from toilet bowls and urinals. 561,346. Selig Co.

MAGIC WATER. Cleaning composition. 561,603. Witt Cleaner Co.

Skrout. Chemical cleaning fluid. 562,061. Hysan Products Co.

CHIRP. Cleaning composition. 563,077. Monsanto Chemical Co.

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